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An Analysis of the Linkages between Canadian Trade Flows, Productivity, and Costs

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The findings of this paper are the sole responsibility of the authors.

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Foreword

In *Pulling Together: Productivity, Innovation, and Trade*, the Economic Council of Canada showed that Canada's manufacturing sector has become considerably less cost competitive compared with the U.S. sector since 1986. At the same time, its cost competitiveness improved somewhat with respect to some other major trading nations.

The analysis in this paper presents a detailed examination of Canada's manufacturing labour costs compared with those in the United States, Germany, and Japan. The authors also look at how inflation and changes in productivity, real wages, payroll taxes, and exchange rates have affected Canada's relative cost position.

They then use econometric techniques to analyse how the relative costs and productivity of Canadian manufacturing industries affect their trade with these countries and the newly industrialized countries of Asia (Hong Kong, Singapore, South Korea, and Taiwan). They estimate the contribution of various important factors to trade flows and the structure of trade in the short to medium term as well as the long term. They also analyse the possible medium-term implications of the relative cost changes since 1986 for Canada's trade with these regions. Their analysis suggests that the difficulties experienced by Canadian manufacturers in recent years are mainly due to the large deterioration in their cost competitiveness vis-à-vis the United States during the period 1986-90. Rao and Lemprière expect that these difficulties will persist in the medium term.

The relative cost estimates presented here are somewhat different than those shown in *Pulling Together* because the authors have updated and revised their figures using the latest data available, including the recent (January 1992) revisions to the U.S. National Accounts.

The authors, Someshwar Rao and Tony Lemprière, were economists on the staff of the Council.

Judith Maxwell
Chairman

Abstract

This paper analyses the linkages between Canadian productivity, costs, and trade. A brief summary of the recent trends in Canada's export and import flows and cost performance is first given. This is followed by a discussion of the factors that theoretically influence Canada's trade patterns and flows. Equations for Canada's exports to, and imports from, the United States, Japan, the European Community, and the newly industrialized countries of Asia (Hong Kong, Singapore, South Korea, and Taiwan) are then econometrically estimated. These equations are derived for 14 broadly defined manufacturing industries. Relative costs rather than relative prices are used as key explanatory variables in the equations.

The analysis reveals that Canadian manufactured exports and imports are influenced by domestic and foreign costs, domestic and foreign demand, capacity utilization, and other factors (investment linkages, economic integration, product quality, intra-regional trade, the "catch-up" phenomenon, etc.). The comparative advantage position of Canada and its trading partners, the structure of trade protection at home and abroad, the structure of costs, and investment linkages help to shape the pattern of trade.

Growth in Canadian manufactured exports and imports in the long term is seen to be determined mainly by growth in domestic and foreign demand, since temporal variations in cost factors even out over the long haul. However, in the short and medium terms, cost factors play a large role in export and import flows. They are also found to have a significant influence on the industry structure of Canadian manufacturing trade both in the short and long terms.

Estimates of the impact on trade of the recent (1985-90) changes in Canada's cost position imply that the current difficulties of Canadian manufacturing industries largely reflect a loss in cost competitiveness vis-à-vis the United States. These difficulties are expected to persist in the medium term. In the long term, it is expected that the Canadian economy will adjust through a combination of some real income loss and an improvement in relative productivity.

READER'S NOTE

The reader should note that various conventional symbols similar to those used by Statistics Canada have been used in the tables:

. . figures not available
. . . figures not appropriate or not applicable
– nil or zero.

Introduction

Canada has historically run a deficit on its service account transactions including travel, freight and shipping, other business services, investment income, and net transfers to foreigners. The deficit increased steadily from \$2.1 billion in 1971 to \$33 billion in 1990.[1] Much of it can be attributed to the shortfall in the investment income account, reflecting the large dependence of the Canadian economy on foreign capital.

However, Canada experienced a steady rise in its merchandise trade surplus, and this largely offset the deficit on the service account until 1985. Consequently, the deficit on Canada's current account changed only marginally – from a surplus of \$0.4 billion in 1971 to a deficit of \$3 billion in 1985.

But since 1985, Canada's current account deficit has worsened markedly. It reached \$22 billion in 1990. This deterioration has been largely due to a reversal of the historical trend in the merchandise trade balance. In contrast to the pre-1985 experience of a fairly steady increase, the merchandise trade surplus actually declined from \$16.4 billion in 1985 to \$10.9 billion in 1990. The deterioration in the trade and current account balances is likely due in part to the substantial deterioration in Canada's cost position in the post-1985 period. In turn, this partly reflects the sharp appreciation of the Canadian dollar vis-à-vis the U.S. currency.

The recent deterioration in Canada's cost competitiveness and the current account balance has lead to two concerns about Canada's medium- to longer-term economic prospects. First, some observers fear that Canada could experience a much more serious and intractable twin-deficit (budget and current account) problem than the United States has experienced since the mid-1980s, unless governments correct the imbalances in Canadian macroeconomic policies. Large and persistent current account and budget deficits could adversely affect productivity, employment, real income, and foreign indebtedness in the long term. A second concern is that the continuation of the present macroeconomic policy mix could inflict serious and long-lasting damage to the health of the tradable sector in Canada, especially the manufacturing industries. As a result, Canada's dependence on resources and resource-based manufactured exports could increase further. Such adverse changes in the structure of Canada's exports could limit the scope for future improvements in Canadian productivity and real income [Courchene 1990; Rao and Lemprière 1992*a*].

The goal of this study is to shed some light on these concerns by undertaking an econometric analysis of the linkages between trade flows, costs, and productivity of Canadian manufacturing industries in relation to the United States, the European Community (EC), Japan, and the newly industrialized countries (NICs) of Asia, that is, Hong Kong, Singapore, South Korea, and Taiwan. The study is organized in the following way. First, we provide an overview of the trends in Canada's manufacturing cost performance vis-à-vis the other G-7 countries and the Asian NICs. We also provide an overview of the trends in Canada's export and import flows, disaggregated by country/region and by industry.

Second, we outline an econometric model of trade flows and trade patterns. Third, we discuss the determinants of Canada's trade flows and trade patterns as revealed by econometric analysis. We also present our econometric estimates of the long-term export and import cost elasticities for the trade of Canadian industries with four countries/regions.

Fourth, we discuss the contribution of such factors as apparent consumption, cost competitiveness, and noncost factors to the growth in the exports and imports of Canadian industries over the period 1971-86, disaggregated by region. We also assess the medium-term impact of the recent (1985-90) changes in Canada's relative cost position on its manufactured trade flows. Finally, in the concluding section, we summarize the important findings of our study and suggest what they imply for public policy.

An Overview of Trends in Canada's Cost Performance, Trade Flows, and Trade Patterns

Before we proceed with the analysis of the determinants of Canada's export and import performance, it is useful to first examine the broad trends in Canada's cost performance, trade flows, and trade patterns. This summary will enable the reader to better understand and appreciate the econometric analysis presented later on.

Cost Performance in Canadian Manufacturing

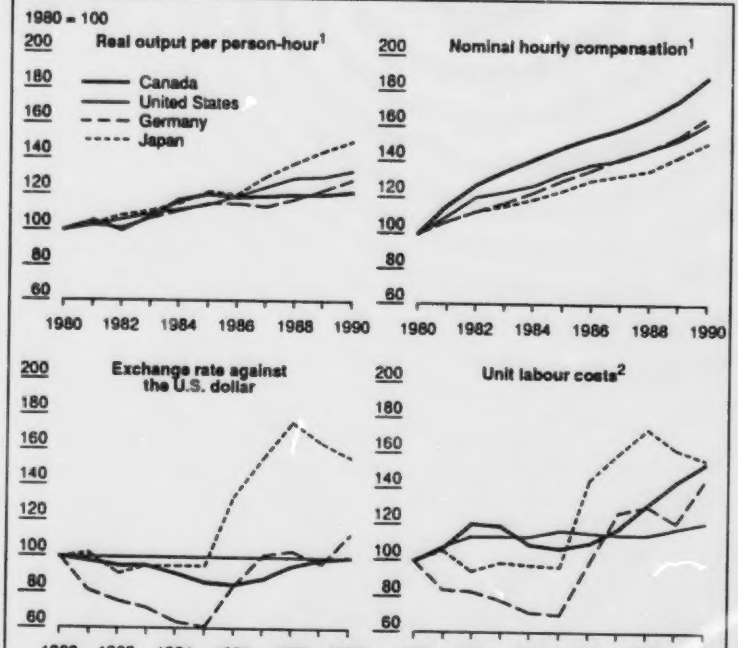
In the longer term, the competitive position of a nation depends on its productivity performance. In turn, this determines its ability to raise real wages and sustain living standards relative to other countries. But in the short-to-medium term, changes in exchange rates and input prices also play an important role in determining a country's international cost performance. International cost competitiveness is often measured in terms of manufacturing unit labour costs, expressed in a common currency, because labour represents the most important nontraded input into manufacturing production, and manufactured goods constitute the bulk of world merchandise trade. Unit labour costs capture the net impact of changes in manufacturing labour productivity, hourly compensation, the exchange rate on manufacturing costs, and hence on the price of manufactures.

Trends in Unit Labour Costs

The large swings in market exchange rates during the 1980s greatly influenced the trends in unit labour costs (relative cost position) in the major industrialized countries (Figures 1 and 2; Tables 1 to 3). (The reader will find Tables 1 to 36 on pages 41 to 84.) Canada's manufacturing cost position vis-à-vis Japan, the four G-7 countries from Europe, Taiwan, and South Korea improved significantly between 1985 and 1990, thanks to the appreciation of their currencies in relation to the Canadian dollar (Table 4). Nevertheless, this improvement has been of little comfort to Canada for three reasons:

Figure 1

Indicators of competitiveness in manufacturing, Canada, the United States, Germany, and Japan, 1980-90



1 Based on data expressed in national currencies.
2 Based on data expressed in U.S. dollars.
Source Estimates by the authors, based on data from Statistics Canada and from the U.S. Bureau of Labor Statistics.

1 Japan and Germany still possess a significant absolute cost advantage over Canada in their major export sector, the machinery and equipment industries [Rao, Tcharkari, and Lemprière 1990];

2 Manufacturing unit labour costs in Taiwan and South Korea are less than 40 per cent of the costs in Canada (Table 4); and

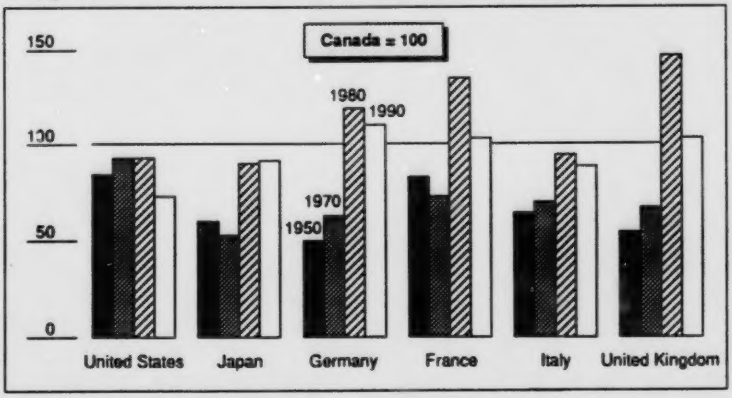
3 Much of Canada's manufactured trade is with the United States.

U.S. manufacturing unit labour costs in 1990 were about 26 per cent below Canadian costs, compared with a U.S. cost disadvantage of 3 per cent in 1985 (Table 4). At no other time in the postwar period has the Canada-U.S. gap been so wide as in 1990. Moreover, the deterioration of Canada's cost position is pervasive across all two-digit manufacturing industries. The U.S. cost advantage in 1990 varied from a low of 1 per cent in transportation equipment to a high of 44 per cent in nonelectrical machinery and rubber and plastic products (Table 5).

Slower productivity growth (29 per cent) and faster increases in nominal hourly compensation (70 per cent) accounted for virtually all of the widening of the Canada-U.S. cost gap between 1980 and 1990 (Table 1 and Figure 3). The market exchange rate in 1990 was about the same as in 1980 and thus did not contribute to the widening of the cost gap over the decade as a whole. Nevertheless, there is no doubt that the large appreciation of the Canadian

Figure 2

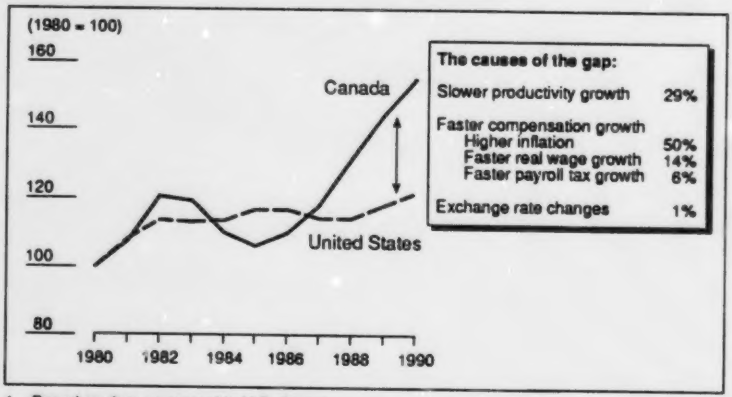
Comparison of unit labour costs in manufacturing,[1] 1950-90



[1] Based on market exchange rates.

Source Estimates by the authors, based on data from the U.S. Bureau of Labor Statistics.

Figure 3
Unit labour costs in manufacturing,[1] Canada and the United States, 1980-90



1 Based on data expressed in U.S. dollars.
Source Estimates by the authors, based on data from the U.S. Bureau of Labor Statistics.

dollar between 1986 and 1991 compounded the cost difficulties of Canadian manufacturers. It accounted for about 45 per cent of the deterioration in relative costs between 1985 and 1990.

The faster growth in Canada's nominal hourly compensation relative to the United States in the 1980s was almost entirely due to the faster growth in Canadian consumer price inflation. Faster real wage growth and larger increases in payroll taxes in Canada added to the effect of higher inflation (Table 6).[2] In the same period, faster growth in consumer price inflation was the sole reason for the faster increase in Canada's nominal hourly compensation relative to Japan and Germany. The growth in Canadian real wages during this period, on the other hand, was substantially lower than in these two countries. Japanese and German manufactures were able to provide substantial growth in real wages while keeping nominal wage growth relatively low because of lower inflation rates (Table 6).

Canada's Trade Performance

The data source for our trade analysis is the World Trade Data Base, recently developed by Statistics Canada. It provides a complete and internally consistent matrix of annual merchandise trade flows (both exports and imports) for about 170 countries, disaggregated by approximately 600 commodities, and covering the period 1971-89.

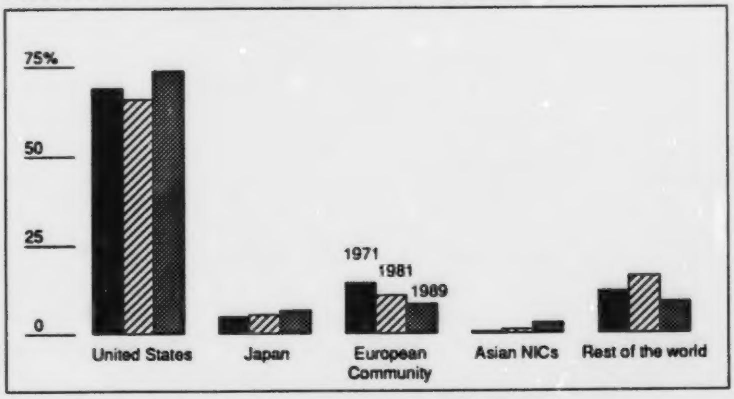
For the purposes of this study, we aggregated the World Trade Data Base into six major regions: Canada, the United States, the European Community, Japan, the Asian NICs, and the rest of the world. For these six regions, the trade flows were converted from a commodity base to an industry base.[3] Our aggregation includes 16 industries – 14 manufacturing industries, farming (agriculture, forestry, and fishing and trapping), and mining. A review of the trends in the export performance (market shares) of these industries in the five major regions of the world economy is available from the authors upon request.

Canada's Export Flows and Patterns

The value of Canadian merchandise exports has increased dramatically over the last several decades, rising from US$19 billion in 1971 to over US$121 billion in 1989 (Table 7b). However, Canada's share of world merchandise exports declined from 5.3 per cent in 1971 to 3.8 per cent in 1981. In the 1980s it recovered some of the lost ground – it reached 4 per cent in 1989.

The importance of the U.S. market for Canadian exports increased substantially in the 1980s, with 74 per cent of Canada's exports going there in 1989, compared with 65 per cent in 1981. The increase in the U.S. share came at the expense of the European Community and the rest of the world (Table 7b and Figure 4). The increased importance of the United States for Canadian

Figure 4
Distribution of Canadian exports, 1971, 1981, and 1989



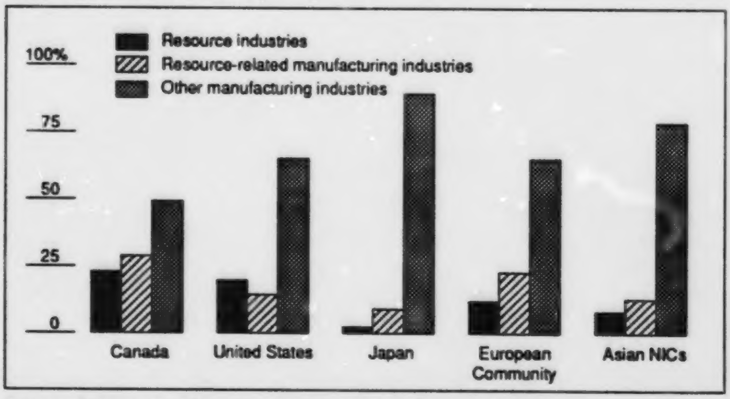
SOURCE Estimates by the authors, based on data from Statistics Canada.

exports reflects the strong growth in U.S. final demand in the 1980s, and the marked deterioration in the cost position of U.S. industries in the period 1980-85, largely due to the sharp appreciation of the U.S. dollar vis-à-vis the currencies of the European countries and Japan. The poor economic performance during the 1980s of Latin American, south-east Asian (Malaysia, Thailand, Indonesia, and Philippines), and Middle East countries could also have played a role in changing the geographic pattern of Canadian exports [Rao 1992].

More than half of Canada's exports are resources and resource-related products, although this share has declined since the early 1970s (Tables 7a and 7b). Resource-based manufactured products accounted for about 37 per cent of Canada's total manufactured exports in 1989, compared with only 18 per cent in the United States, 26 per cent in the European Community, and 9 per cent in Japan (Figure 5). However, Canada's dependence on resource-based manufactured exports declined significantly over the course of the 1980s because of a large increase in transportation equipment exports (mostly automobiles). That industry's share in Canada's total manufactured exports rose from 26 per cent in 1981 to 33 per cent in 1989 (Table 7a).

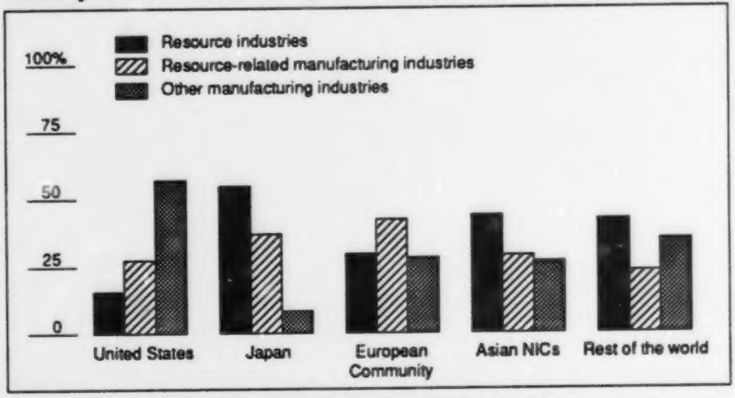
The greater role of the transportation equipment industry in the 1980s was mainly due to a substantial growth in automobile exports to the United States. This was reflected in the share of manufactured exports in Canada's total merchandise exports to the United States – it increased from 74 per cent in 1981 to 84 per cent in 1989 (Table 7b).

Figure 5
Industry share in total exports, 1989



Source Estimates by the authors, based on data from Statistics Canada.

Figure 6
Industry share in Canada's exports to various regions, 1989



Source Estimates by the authors, based on data from Statistics Canada.

But while manufactured goods represent a significant part of Canada's exports to the United States, they are much less important in other markets. They accounted for only 45 per cent of total goods exports to Japan in 1989. Moreover, resource-based manufactured goods (primarily food, beverages, and tobacco; lumber and furniture; paper and publishing; and primary metal products) represented over 80 per cent of Canada's manufactured exports to Japan. Similarly, resources and resource-based manufactured products dominate Canadian merchandise exports to the European Community, the Asian NICs, and the rest of the world (Table 7b and Figure 6).

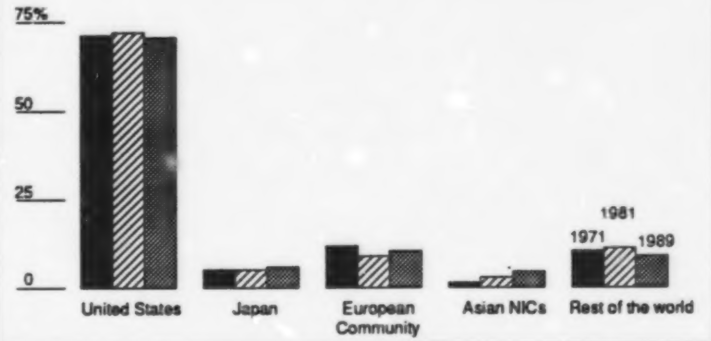
Canada's Import Flows and Patterns

As was the case with exports, the value of Canadian imports has grown markedly during the past decades. It increased from US$15.9 billion in 1971 to US$125.7 billion in 1989. Manufactured products currently account for about 75 per cent of all Canadian imports of goods (Table 8b).

But unlike trends in the geographic distribution of Canadian exports, the role of the United States in Canada's merchandise imports declined somewhat in the 1980s. Its share fell from 72 per cent in 1981 to 71 per cent in 1989. Similarly, the U.S. share of manufactured imports dropped from 75 per cent in 1981 to 66 per cent in 1989 (Tables 8a and 8b; Figure 7).

Most of what the United States exports to Canada are products of the higher value-added industries. In 1989, nonelectrical machinery (17 per cent), electrical

Figure 7
Distribution of Canadian Imports, 1971, 1981, and 1989



Source Estimates by the authors, based on data from Statistics Canada.

machinery (17 per cent), transportation equipment (33 per cent), and chemicals and chemical products (7 per cent) constituted about 75 per cent of U.S. manufactured exports to Canada. However, the share of manufactured products in total U.S. merchandise exports to Canada declined from 86 per cent in 1971, to 85 per cent in 1981, and to 70 per cent in 1989 (Table 8b).

The importance of manufactured products in total exports by the EC countries to Canada has also declined during the last 20 years. It fell from 96 per cent in 1971, to 90 per cent in 1981, and to 86 per cent in 1989. But despite the reduced importance of manufactured products, the share of the European Community in Canada's total merchandise imports increased substantially in the 1980s, from about 8.6 per cent in 1981 to 10.4 per cent in 1989.

Manufactured products have accounted for virtually all of the Japanese merchandise exports to Canada in the past two decades. The Japanese share of Canadian manufactured imports increased substantially in the 1980s – from 6.5 per cent in 1981 to 7.7 per cent in 1989. More importantly, the three machinery and equipment industries now represent about 80 per cent of total Japanese manufactured exports to Canada, having steadily increased from about 48 per cent in 1971 (Table 8a).

The largest growth in Canadian imports has been in those from the Asian NICs, which increased from a mere US$217 million in 1971 to US$5.9 billion in 1989. This is more than a 25-fold increase, although the level is relatively small. Manufactured exports represented over 96 per cent of the total exports of the Asian NICs to Canada in 1989, compared with 89 per cent in 1971.

And, as with Japan, the importance of the machinery and equipment industries in their manufactured exports to Canada has increased dramatically. In 1989, these three high-tech industries accounted for about 38 per cent of their manufactured exports to Canada, compared with only 8 per cent in 1971 (Table 8a).

As for the rest-of-the-world countries, the composition of their exports to Canada has also changed substantially. In 1976, the share of manufactured products in their total exports was 37 per cent, but this had risen to 68 per cent by 1989 (Table 8a). Large reductions in the real prices of primary commodities, including oil and gas, are likely part of the reason for the important changes in the composition of their merchandise exports. But the main reason may be that the manufacturing sector has assumed increasing significance in the domestic economies of many of these countries [World Bank 1987].

An Econometric Model of Canada's Trade Flows

The preceding section examined the broad trends in Canada's exports and imports, disaggregated by industry and region. We now turn to the task of attempting to isolate the causal factors behind these trends.

Based on past research in the areas of trade flows, intra-firm and intra-industry trade, comparative advantage, and foreign direct-investment flows, we assume that Canada's exports and imports can be modelled as follows:[4]

$$\begin{aligned} EX_{ij}^{c} = {} & F\Big[\left(Q_i^j + IM_i^j - EX_i^j\right), \left(ULC_i^c \,/\, ULC_i^j\right), \\ & \left(ULC_i^c \,/\, ULC_i^o\right), \left(RD_i^c \,/\, RD_i^j\right), \left(RD_i^c \,/\, RD_i^o\right), \\ & TB_i^j,\ NTB_i^j, \left(F_{ij}^c \,/\, F_i^j\right), CAD_i^j,\ CU_i^j,\ REXRV_i, t\Big] \qquad (1) \\ & \qquad i = 1 \ldots n;\ j = 1 \ldots m \end{aligned}$$

$$\begin{aligned} IM_{ij}^{c} = {} & G\Big[\left(Q_i^c + IM_i^c - EX_i^c\right), \left(ULC_i^j \,/\, ULC_i^c\right), \\ & \left(ULC_i^j \,/\, ULC_i^o\right), \left(RD_i^j \,/\, RD_i^c\right), \left(RD_i^j \,/\, RD_i^o\right), \\ & TB_i^c,\ NTB_i^c, \left(F_{ic}^j \,/\, F_i^c\right), CAD_i^c,\ CU_i^c,\ REXRV_i, t\Big] \qquad (2) \\ & \qquad i = 1 \ldots n;\ j = 1 \ldots m \end{aligned}$$

where

EX_{ij}^{c} = the Canadian exports of the i^{th} industry to the j^{th} region;

IM_{ij}^{c} = the Canadian imports of the i^{th} industry from the j^{th} region;

$(Q_i^j + IM_i^j - EX_i^j)$ = the apparent consumption (output less exports plus imports) of the i^{th} industry in the j^{th} region;[5]

$(Q_i^c + IM_i^c - EX_i^c)$ = the apparent consumption of the i^{th} industry in Canada;

ULC_i^c = the Canadian unit labour costs in the i^{th} industry;

ULC_i^j = the unit labour costs of the j^{th} region in the i^{th} industry;

ULC_i^o = the unit labour costs of other (third) countries in the i^{th} industry;

RD_i^c = the Canadian R&D/output ratio in the i^{th} industry;

RD_i^j and RD_i^o = the R&D/output ratios of the j^{th} region and (third) countries, respectively;

TB_i^c and TB_i^j = the Canadian and the j^{th} region average tariff rates in the i^{th} industry;

NTB_i^c and NTB_i^j = the Canadian and the j^{th} region nontariff barriers (tariff equivalent) in the i^{th} industry;

F_{ij}^c and F_{ic}^j = the total Canadian foreign direct investment (stock) of the i^{th} industry in the j^{th} region, and the total j^{th} region foreign direct-investment stock of the i^{th} industry in Canada;

F_i^c and F_i^j = the total capital stocks of the i^{th} industry in Canada and the j^{th} region;

CAD_i^c and CAD_i^j = the comparative advantage proxies for the i^{th} industry in Canada and the j^{th} region;

CU_i^c and CU_i^j = the capacity utilization rates of the i^{th} industry in Canada and the j^{th} region;

$REXRV_i$ = the variability of the bilateral real exchange rate in the i^{th} industry; and

t = the time trend.

According to equation 1, Canadian exports of the i^{th} industry to the j^{th} region are influenced by the trends in apparent consumption in the j^{th} region, Canada's unit labour costs and R&D/output ratio relative to the j^{th} region and other (third) regions, trade (tariff and nontariff) barriers, the comparative advantage and capacity utilization of the j^{th} region, foreign direct-investment linkages between Canada and the j^{th} region, and the variability in the bilateral real exchange rate.[6]

Similarly, Canadian imports of the i^{th} industry from the j^{th} region are determined by the trends in Canada's apparent consumption, unit labour costs of the the j^{th} region and the R&D/output ratio relative to Canada and other (third) regions, Canada's tariff and nontariff barriers, the comparative advantage and capacity utilization of Canada, foreign direct-investment linkages between Canada and the j^{th} region, and the variability in the bilateral real exchange rate.

Dependent Variables

In conventional trade and macroeconometric models, export (import) quantities are commonly used as dependent variables. Export and import prices are also determined endogenously.[7] However, there are no reliable data on export and import volumes for many countries because of the serious difficulties in compiling price series to convert the value data into volume measurements. Moreover, data problems are insurmountable for developing reliable data on the volume of trade on a disaggregated industry and regional level.

In view of these difficulties, in this study we model the value of exports and imports, rather than volumes. Since the volume price elasticity of demand is equal to the value elasticity minus one, this procedure still permits estimation of the former [Branson 1968]. In addition, it is possible that this approach could do a better job of estimating (forecasting) the value of imports and exports than estimating prices and quantities separately. On the other hand, the main disadvantage of estimating a single equation for the value is that the estimated coefficients might represent some unknown interaction of volume-price influences.

Independent Variables

Apparent Consumption

Real income or real expenditure are commonly used as the scale (main independent) variable in import and export demand equations [Goldstein and Khan 1985]. But if the dependent variable (imports or exports) is disaggregated by either commodity or industry, a disaggregated real consumption-expenditure variable will do a better job of explaining the trends in export and import patterns [Deppler and Ripley 1978].

Since the dependent variables (exports and imports) are in value terms, the value of apparent consumption (output less exports plus imports) of each industry is used as the principal independent variable in the export and import equations.

Relative Unit Labour Costs

In disaggregated export and import (quantities) equations, relative prices (commodity- or industry-specific) are often used to estimate own- and cross-price elasticities [Hickman and Lau 1973; Deppler and Ripley 1978; Cline 1990]. However, here we use relative unit labour costs rather than relative prices. In part this was determined by data limitations – we do not have disaggregated industry data on export and import prices by country. But this approach also allows us to establish a direct link between the components of cost competitiveness (productivity, input prices, and the exchange rate) and trade flows, the primary objective of this study.

Trends in output prices, and hence trends in export and import prices, are expected to be largely influenced by trends in unit costs in the medium to longer term. However, in the short term, capacity utilization and foreign competition also play an important role in the determination of output prices, through their impact on profit margins [Goldstein and Officer 1979; Deppler and Ripley 1978; Artus and McGuirk 1981]. Thus variations in domestic unit costs relative to those in competing countries are expected to be the main influence on long-term trends in relative export and import prices. In addition, in the long run, a small open economy such as Canada might largely take world export prices as given and adjust its output (exports) and employment levels in response to changes in foreign demand and relative cost conditions.

The relevant cost variables are those for unit total costs. But since we lack reliable data on unit total costs for countries other than Canada and the United States, we have used relative unit labour cost variables as proxies. This substitution is reasonable – unit labour cost and unit total costs tend to move together. For example, Rao and Lemprière [1992*b*] found a high positive correlation between the two cost variables in Canadian and U.S. industries during the period 1961-88.

Variations in unit labour costs are expected to influence domestic and export prices with considerable delay, implying that the lead-lag relationship between changes in relative unit labour cost and trade flows will be fairly long. Consequently, the estimated short-run cost elasticities of exports and imports could be much smaller than the short-run price elasticities usually reported in the empirical literature.[8]

Comparative Advantage

A country cannot be a net exporter or a net importer of all goods regardless of how efficiently it can produce them compared with other countries. Instead, in the long run it will specialize in goods in which it has a comparative advantage – products that it makes relatively more productively and less expensively than its trading partners. Similarly, it will import those products and services its trading partners produce less expensively. Thus comparative advantage largely determines the trade patterns among countries. Trends in a country's trade patterns are also influenced by longer-term trends in the relative cost position of its industries (dynamic comparative advantage). At the same time, trends in relative cost competitiveness also affect the magnitude of export and import flows, and hence help to determine trade balances and market shares [Morici 1988; Lawrence 1984; Maskur 1983; Leamer 1984].

According to the Heckscher-Ohlin theorem of comparative advantage, nations gain factor-based comparative advantage in industries that make intensive use of factors they possess in abundance. For example, nations with rich endowments of natural resources will specialize in products that depend on them. On the other hand, countries with an abundant supply of labour input will specialize in labour-intensive products [Balassa 1977; Balassa and Noland 1988; Leamer 1984].[9]

We assume that industries in which a country specializes will exhibit higher productivity than average. Thus we use the productivity of an individual industry relative to the aggregate manufacturing productivity level as a proxy for the comparative advantage variable. The industries with high relative productivity levels are expected to exhibit lower import penetration and higher export orientation, and vice versa. Similarly, changes in trade patterns are expected to be influenced by the trends in the comparative advantage variable.

Foreign Direct Investment

Multinational corporations play an important role in the world economy via their production, investment, and trade activities. The largest 600 transnational corporations account for between one fifth and one quarter of the gross domestic product of world market economies. Their importance as exporters and importers is even greater – nearly half of the world's international exchange takes place between multinational enterprises [Stopford 1982]. The proportion of bilateral intra-firm trade is higher still, at around 70 per cent [MacCharles 1987].

Between 80 to 90 per cent of Canadian and U.S. exports of goods and services are carried out by multinationals. In addition, much of the trade between Canada and the United States is intra-firm in nature. For instance, between 1974 and 1981, foreign affiliates of U.S. firms exported an average of 70 per cent of their sales to their parent corporations and imported a corresponding amount of their purchases from their parents [Rugman 1988].

Despite the vital role of multinationals in international trade, there is no consensus among economists about the causal relationship between foreign direct investment and trade flows. For instance, Safarian [1985] argued that domestic tariff and nontariff barriers initially forced foreign companies to locate production facilities in Canada to serve its market. This argument suggests that foreign direct investment is a substitute for imports and implies a negative relation between them.

However, recent theories of foreign direct investment suggest that trade barriers (actual as well as potential) are not the key determinant of whether or not foreign direct investment occurs. Rather, the growing economic interdependence among nations and the consequent rise in competitive pressures force domestic firms to search for productivity enhancing and cost-cutting sources and methods of production, and that often means direct investment in other countries. Added to this are the growing investment-savings imbalances among countries and the considerable relaxation of restrictions on foreign direct investment and foreign exchange transactions in both developed and developing countries. These arguments in turn imply a positive relationship between trade and foreign direct-investment flows, because greater specialization will considerably increase the two-way trade between parent companies and their subsidiaries. Many recent statistical studies which examined the linkages have concluded that foreign direct investment and trade are indeed complements rather than substitutes [Caves 1990; UNCTC 1988; Rugman 1988; Ray 1989].

In an effort to measure the influence of foreign direct-investment linkages on Canada's trade flows and trade patterns, the share of foreign direct investment (stock) in the total capital stock of the industry concerned is included as one of the independent variables in the industry export and import equations.

Trade Barriers

Both the level and the structure of Canada's exports and imports will be significantly influenced by the level and the structure of trade barriers at home and abroad. Formal trade barriers include tariff and nontariff measures that are stated explicitly in official legislation. On the other hand, informal barriers are not transparent and are difficult to measure. These barriers are the result of conscious efforts by governments to favour domestic industries and/or are the by-product of policies and practices that are rooted in domestic institutions. Nontariff measures include quantitative restrictions (import quotas, voluntary export restraints, prohibitions, domestic content and mixing requirements, export limitations, etc.); countervailing and antidumping duties; various forms of subsidies; discriminatory government procurement practices; customs procedures and administrative practices; and various technical barriers [Saxonhouse and Stern 1988]. Our variables for nontariff barriers are based on tariff equivalents of some of these types of restrictions, as measured by Deardorff and Stern [1989].

Capacity Utilization

As mentioned above, unit labour costs affect trade flows with a considerable lag. In the very short run, variations in costs are expected to be largely absorbed by variations in profit margins. However, the responsiveness of profit margins to changes in cost conditions is likely to be influenced by the demand conditions in the industry concerned. For instance, if there is a considerable slack in demand (lower capacity utilization), producers will probably absorb cost increases rather than pass them on in the form of increased domestic and export prices. Thus, other things being equal, a reduction in the capacity utilization rate would reduce the pass through from costs to prices, and hence moderate the impact of costs on trade flows. Therefore a positive relationship between imports and domestic capacity utilization is expected. Alternatively, a negative relationship is possible if increasing capacity utilization allows scale effects to reduce domestic costs and, other things being equal, results in reduced imports penetration.

R&D/Output Ratio

The extensive volume of trade between the industrialized countries, and large and growing intra-industry trade flows, indicate that there are considerable two-way exchanges of products within the same industry. This cannot be entirely explained by factors related to demand, costs, comparative advantage, or foreign direct-investment linkages. It highlights the fact that trade flows and trade patterns are also influenced by product quality, product differentiation, after sales service, and product reliability.

The influence of these noncost and nonprice factors is often modelled by the inclusion of a technology gap variable in trade equations [Posner 1961;

Hufbauer 1966; Costomitis, DeBresson, and Kwan 1990]. Following Hanel [1976, 1983], we use a relative R&D/output ratio variable as a proxy for the technology gap variable. Other things being equal, an increase in the R&D/output ratio of an industry relative to its foreign competitors is expected to lower import penetration and raise export orientation, and vice versa.

Exchange Rate Variability

In the past, many studies have attempted to capture the influence of exchange rate variability on trade flows [Akhtar and Hilton 1984; Gotur 1985; Cushman 1986; Côté 1986; Perée and Steinherr 1989]. An increase in the value of the domestic currency is equivalent to an increase in the price that foreign buyers must pay for a firm's exports, and thus adds a measure of uncertainty to the exporting process. In turn, this introduces a negative risk, and an increase in such risks, or in risk aversion, is likely to reduce exports. On the other hand, of course, expected increases in profit margins that result from downward movements in the value of the domestic currency could stimulate exports to the exporting process.

Following Hooper and Kohlhagan [1978] and Cushman [1983], we include bilateral real exchange rate variability as an independent variable in the trade equations. The risk associated with exchange rate variability is often measured as the standard deviation of either the nominal or the real exchange rate. Here we compute it as the absolute percentage deviation of the real exchange rate from its average value over the previous five years.

Time Trend

A time trend in equations 1 and 2 is expected to pick up the longer-term impacts on influences not captured by the other independent variables and which are hard to quantify. The trend growth in world trade brought on by the growing economic and financial integration among nations is one such important effect. Increasing intra-regional trade (in the European Community and the Asia/Pacific region especially) is one important aspect of this integration. Another effect is the "catch-up" phenomenon. This is especially relevant when examining trade with the Asian NICs, since these nations have been rapidly growing, industrializing, and moving up the value-added ladder in their exports while maintaining substantial cost competitiveness. The trend term could also capture the influences on the value of exports and imports of longer-term changes in product quality, product design, product specialization, the composition of domestic and foreign apparent consumption (volume), and the terms of trade.[10]

Empirical Results

We report two sets of regression results. Our empirical analysis uses the relationships outlined in equations 1 and 2 to explain Canada's trade over the 1971-86 period with the United States, Japan, the European Community, and the Asian NICs in 14 manufacturing industries. The first set is pooled industry and time-series regressions for Canadian exports to, and imports from, the four regions. The second set consists of separate time-series equations for Canada's exports and imports in each of the manufacturing industries and regions.

Greater information regarding certain aspects of the empirical implementation of equations 1 and 2 is given in Appendix B. A description of the variables, their construction, and source is summarized in Figure B-2. All the variables are industry- and region-specific. Except for trade barriers, all the independent variables also vary with time. To allow for the lagged effects of relative costs and R&D/output ratios on exports and imports, noted in the previous section, we used five-year moving averages of these variables in the regression equations.

The purpose of this study is to determine the extent to which trade patterns and trends are determined by relative costs and by noncost factors including demand. The trade flow model outlined in the previous section uses exports or imports as the dependent variables. However, in the empirical implementation of the model we used export penetration (the share of Canada's exports in the apparent demand of each of the four regions) and import penetration (the share of imports from each region in Canadian apparent demand) as the dependent variables. This implicitly constrains the demand elasticities of Canada's exports and imports to be one. We checked this assumption by estimating cross-industry regressions of growth in imports on growth in apparent consumption in Canada, the United States, the European Community, and Japan. These regressions suggested that the long-term expenditure elasticity is not significantly different from one. The export and import penetration variables enable us to easily decompose the sources of growth in trade of Canadian manufacturing industries, as discussed in the next section. A drawback is the further implicit assumption that the growth in demand for the output of an industry does not have a differential impact on imports according to their source.

All the export and import equations are estimated in log-linear form. There are two main advantages to this form: first, the estimates of long-term cost elasticities of export and import demand can be directly obtained from the regression equations. Second, log-linear forms are preferable to linear forms because the latter imply falling cost elasticities as export and import quantities grow relative to the cost variables [Barker 1970; Sheills, Stern, and Deardorff 1986].

The pooled and the industry regression results are displayed in Tables 9 to 18. In the pooled equations we added industry dummies to capture industry-specific effects on the constant term. The empirical results are encouraging on two counts. First, the size of $\bar{R}^2$ (the coefficient of determination, adjusted for degrees of freedom) is fairly large in all the regression equations, implying that the explanatory power of the model is fairly good. Second, the sign and the size of the coefficients are generally in line with a priori expectations.

Canada's Exports to the United States

Pooled Regression Equation

As expected, Canadian export penetration is negatively related to the two cost variables – Canada's costs relative to the United States and to other (third) countries (Table 9). But the size of the two long-term cost elasticities are well below one (–0.6 and –0.1). These results imply that the short-term impact of changes in relative costs on Canadian exports to the United States is very small. However, large changes in cost competitiveness could have a considerable cumulative effect on Canadian exports to that country in the long term.

The coefficient on the R&D variable is positive and highly significant, suggesting that the flow and pattern of Canada's exports to the United States are positively influenced by noncost factors – the R&D variable might be picking up the influence of product quality, product differentiation, product design and so on, on exports. The level and the structure of U.S. tariff and nontariff barriers also seem to have a significant impact.

The coefficient of the variable measuring real exchange rate variability is negative, but it is not significant statistically, implying that the impact of real exchange rate variations on Canada's exports to the United States is negligible.

The coefficient on the time trend implies an average trend growth of 4.1 per cent per year for Canadian manufactured exports to the United States, independent of other factors. This likely represents the influence of growing economic integration between Canada and the United States, largely due to the role of Canadian and U.S. multinationals in intra-firm and intra-industry trade between the two countries. These results strongly imply that the dependence of Canadian exports on U.S. markets is likely to increase in the future, unless substantial changes in relative costs occur and/or U.S. demand (apparent consumption) grows at a much slower pace than in other regions.

The coefficients on the industry dummies primarily reflect the comparative advantage position of the two countries vis-à-vis one another. The regression results suggest that Canada has a strong comparative advantage in the paper and publishing, lumber and furniture, and miscellaneous manufactures industries. On the other hand, the United States has a comparative advantage in the petroleum and coal refining, primary metal products, and fabricated metal products industries. The large positive coefficient on the transportation equipment industry dummy reflects the large integration of the automobile industry in the two countries as a result of the Auto Pact.

Time-Series Regressions

The results of the individual industry time-series equations are summarized in Table 10. These results in general are in line with the pooled results discussed above. The two cost variables, the trend term, and capacity utilization rates are the principal determinants of the trends in Canadian exports to the United States.

The long-term sensitivity of Canadian export values to changes in the two cost variables is significantly less than one in 11 of the 14 industries. Moreover, in three industries (primary metal products; transportation equipment; textiles, clothing, and leather products), the cost elasticity vis-à-vis third-country competitors in the United States is positive and significant. In these industries the value of Canada's exports to the United States actually increases with a deterioration in Canadian cost competitiveness in relation to third countries, implying a positive relationship between Canadian and other countries' exports to the United States. But, as we pointed out in the previous section, a small positive cost elasticity in the export *value* equation is consistent with a negative cost elasticity in the *volume* equation.

In three cases (food, beverages, and tobacco; transportation equipment; and textiles, clothing, and leather) exports to the United States are highly sensitive to changes in Canadian costs relative to U.S. costs – the long-term cost elasticities vary between –2.3 to –3.6.

The capacity utilization variable is significant in only two industries. In the food, beverages, and tobacco industry, the coefficient has the expected sign and implies that an increase in the U.S. capacity utilization rate increases the demand for Canadian exports. In contrast, in the nonelectrical machinery industry the coefficient is negative, but quite small.

As with the pooled regression equation, the time-series results imply that Canadian exports to the United States are greatly influenced by noncost factors, a reflection of large intra-firm and intra-industry trade between the two countries. In 11 of the 14 industries the coefficient on the time trend is positive and highly significant. The estimated trend growth rate varies from a low 2.8 per cent in the lumber and furniture industry to a high of 8.5 per cent in the nonelectrical machinery industry.

Canada's Exports to Japan

Pooled Regression Equation

The coefficients on the two cost variables are negative and significant but quite small (less than 0.1). This suggests that the trends in the value of Canada's exports to Japan are determined more by trends in Japanese apparent consumption than by costs (Table 9). However, a small negative cost-price elasticity in the value equation is consistent with a fairly large (slightly above one) cost-price elasticity in the volume equation.

The coefficient on the time trend is positive and significant. But the estimated trend growth is less than 0.5 per cent per year. In part, this may be attributable to the weak investment linkages between the two countries in the period studied, general difficulties in penetrating the Japanese market due to cultural differences, or an export composition dominated by industries in which Japanese import demand is growing relatively slowly.

The industry structure of Canadian exports seems to be primarily determined by the comparative advantage position of the two countries. As expected, Canada has a comparative advantage in all the resource-based manufacturing industries (with the exception of primary metals), and it is particularly strong in the paper and publishing, and lumber and furniture industries.

Time-Series Regressions

The coefficients on the trend terms in the industry regressions is consistent with the pooled regression results – on average there is no large trend growth in Canada's manufactured exports to Japan (Table 11). But the pattern of the coefficients across industries imply substantial trend (noncost factor) effects on the structure of Canadian exports to that country. For instance, chemical and chemical products, primary metal products, and nonelectrical machinery display a trend growth rate of between 3 to 9 per cent. On the other hand, food, beverages, and tobacco, nonmetallic minerals, fabricated metal products, textiles, clothing, and leather, and rubber and plastic products exhibit a negative trend growth of between 2 to 8 per cent.

Unlike Canadian exports to the United States, the trends in Canada's manufactured exports to Japan are highly sensitive to relative cost movements. In

7 of the 14 manufacturing industries, changes in Canadian costs relative to Japanese costs have a negative and significant effect. In addition, Canada's manufactured exports to Japan respond strongly to changes in Canadian unit labour costs relative to those of third-country competitors (United States and Germany) in six manufacturing industries.

Trends in Canada's manufactured exports are also significantly influenced by the trends in Japanese capacity utilization rates. In 10 of the 14 manufacturing industries the capacity utilization variable enters significantly. In four industries, however, the coefficient is negative, implying that the Japanese industries gain a competitive advantage (price and nonprice) over their Canadian counterparts from their increased capacity utilization rates, presumably due to scale economies.

Canada's Exports to the European Community

Pooled Regression Equation

Variations in Canada's unit labour costs relative to those of the European Community strongly influence the trends in Canadian manufactured exports (value) to that region. The long-term average cost elasticity is very close to one. Changes in costs relative to third-country competitors, in this case Japan and the United States, do not appear to have any impact. This may be due to the fact that much of the trade is conducted among the EC countries themselves. This may also explain why the coefficient on the trend term is negative, in sharp contrast to the U.S. and Japanese equations. Intra-regional trade within the European Community as a proportion of its total trade has been growing in importance, especially as the integration between the United Kingdom and other member countries deepens.

The negative and significant coefficient on the exchange rate variable implies that Canada's exports to the EC countries are negatively affected by real exchange rate variability, similar to the Japanese results.

This export equation is the only one in which the comparative advantage variable has an impact and, as expected, Canadian exports are negatively influenced by the comparative advantage of the EC countries. Our results also indicate that Canada has a strong comparative advantage in the resource-based manufacturing industries (except primary metals) and, somewhat surprisingly, the three machinery and equipment industries. Moreover, Canada's comparative advantage is especially strong in paper and publishing, lumber and furniture, and miscellaneous manufactures. On the other hand, the EC countries have a strong comparative advantage in the primary metals industry.

Time-Series Regressions

The individual industry equations are in close agreement with the pooled regression results. The value of Canadian exports to the EC region are highly sensitive to variations in relative costs (especially Canadian costs in relation to EC costs). Only in the transportation equipment and miscellaneous manufactures industries are cost factors not significant (Table 12).

The industry equations also imply a significant downward trend of 1.9 per cent per year in the value of Canada's manufactured exports to the EC region. In eight of the nine industries in which the time trend enters, the estimated trend growth is negative, ranging from a low of 1.4 per cent in paper and publishing to a high of 12.2 per cent in rubber and plastic products. Only the nonelectrical machinery industry exhibits a positive trend growth.

Canada's Exports to the Asian NICs

The dependent variable in the equations modelling Canada's exports to the Asian NICs is the share of Canadian manufactured exports in the total imports of the NICs. Export penetration ratios for Canada's share in the apparent consumption of the NICs could not be constructed since data on the industry output is not available.

Pooled Regression Equation

As with the Japanese results, intra-industry variations in Canada's manufactured exports to the Asian NICs can be chiefly explained by comparative advantage, domestic demand, and noncost factors (trend growth) rather than cost influences (Table 9).

The coefficients on the industry dummies imply that Canada has a strong comparative advantage in paper and publishing and primary metal products. On the other hand, the Asian NICs have a strong advantage in electrical and nonelectrical machinery and transportation equipment, textiles, clothing, and leather products, and miscellaneous manufactures. These results are consistent with the findings for the other regions (Table 9).

Time-Series Regressions

Changes in Canadian costs (proxied by hourly manufacturing wages) relative to those of the Asian NICs play a significant role in the determination of the trends in the value of Canada's exports to these countries in nine industries

(Table 13). The size of the long-term cost elasticities are fairly large suggesting that Canada's exports to the NICs are quite sensitive to relative cost changes.

Data limitations prevented the use of the capacity utilization rates of the Asian NICs as explanatory variables in these equations. We have, however, used Canadian capacity utilization as an explanatory variable. A negative relationship is possible if improvements in the domestic demand conditions result in some diversion of exports to domestic markets. Alternatively, improvements in capacity utilization could result in scale economies and increased export penetration. Our results show that Canada's exports to the Asian NICs are significantly influenced by the trends in Canadian capacity utilization rates. In two industries, the capacity utilization variable is significantly negative while in four others it is significantly positive.

The equations imply an average trend growth of –1.4 per cent, in sharp contrast to the positive coefficient in the pooled regression. However, the difference between the two results can be reconciled. In the pooled regression, cost variables do not enter significantly, and short-term changes in demand conditions of the NICs as represented by capacity utilization could not be proxied. Thus the trend term there may have captured some of the influence of trend changes in these two variables on the value of exports.

Canada's Imports from the United States

Pooled Regression Equation

Significant explanatory factors were found to be nontariff barriers, foreign direct-investment linkages, the technology gap proxy, real exchange rate variability, and the time trend (Table 14).

The coefficient on the relative R&D intensity variable is positive and significant. In contrast, the two cost variables do not enter the regression equation – noncost factors (quality, product design, product specialization, etc.) appear to be more important influences on Canada's imports from the United States.

The coefficients on the industry dummies show that Canada has a strong comparative advantage in petroleum and coal products and lumber and furniture. On the other hand, the United States has a strong advantage in the electrical and nonelectrical machinery, transportation equipment, textiles, clothing, and leather products, miscellaneous manufactures, and primary metal products.

Our regression results imply that Canadian nontariff trade barriers limit the imports of manufactured products from the United States, but that tariff barriers do not.

The results also show that investment linkages play an important role in the determination of the pattern and magnitude of imports from the United States, reflecting the importance of intra-firm trade in the total trade. This importance is also reflected in the coefficient on the time trend, which is positive and highly significant, as it was in the export pooled regression. It implies, on average, a trend growth of 2.6 per cent for Canada's manufactured imports (value) from the United States.

Time-Series Regressions

Trend terms enter significantly in six industry equations with an implied average trend growth of 1.5 per cent per year (Table 15). Positive trend growth characterizes electrical machinery and transportation equipment, but a negative trend is found for textiles, clothing, and leather products and miscellaneous manufactures. The latter findings could be attributed to the growing competition (catch-up phenomenon) that U.S. exporters face from the Asian NICs and the European Community.

The trends in U.S. unit labour costs (relative to Canadian costs) significantly influence the value of Canada's imports in 10 manufacturing industries. The size of the long-term cost elasticity varies from 0.38 in electrical machinery to –2.90 in nonmetallic mineral products. However, it averages only –0.12, largely because it is either positive or negligible in the three important machinery and equipment industries that account for over 60 per cent of Canada's manufacturing imports from the United States.

The value of Canada's imports from the United States are also significantly influenced by the trends in U.S. unit labour costs in relation to third-country competitors (Japan and Germany) in nine manufacturing industries. Again, however, the average cost elasticity is quite small, because the cost variable does not enter in the equations for the three machinery and equipment industries.

Canadian capacity utilization has a significant impact in seven manufacturing industries, but only in three does it have the expected positive sign. In the other four a negative coefficient suggests that the positive impact on domestic costs of scale effects due to increased capacity utilization dominates the negative impact on profit margins.

Canada's Imports from Japan

Pooled Regression Equation

Apparent consumption, nontariff barriers, relative unit labour costs, foreign direct-investment linkages, comparative advantage, exchange rate variability, industry dummies, and a time trend explain over 95 per cent of the intra-industry and the temporal changes in Canada's manufactured imports from Japan (Table 14).

The size of the negative coefficient on the nontariff barriers variable is much bigger than in the other three import equations and highly significant, suggesting that imports from Japan are considerably restrained by Canadian nontariff barriers. Presumably, this reflects the significant quantity restrictions on imports of Japanese automobiles, electrical machinery, and textiles, clothing, and leather products.

Canada's imports from Japan are also significantly influenced by the trends in Japanese unit labour costs in relation to the trends in Canadian costs. However, the size of the cost elasticity is considerably less than one (–0.38), but this could still be consistent with a fairly large (above one) cost elasticity with respect to the volume of imports.

As expected, the coefficient on the Canadian comparative advantage variable is negative and highly significant. In addition to this general result, Japanese import penetration is substantially lower in petroleum and coal products and nonelectrical machinery. On the other hand, Japan has a strong comparative advantage in textiles, clothing, and leather products, electrical machinery, transportation equipment, miscellaneous manufactures, and primary metal products.

The coefficient on the time trend implies a trend growth of 2.9 per cent per year for Canada's imports from Japan. This may be capturing the influence of trend changes in the quality of Japanese products vis-à-vis their competitors. It might also reflect the fact that Japan is catching up to the United States and other industrialized countries.

Time-Series Regressions

The individual industry results are fairly consistent with the findings of the pooled regression equation. The trends in the value of Canada's imports from Japan are significantly influenced by the trends in relative Japanese unit labour costs in 10 of the manufacturing industries (Table 16). However, the size of the cost elasticity varies considerably across industries – from –0.4 to

–6.3. Imports of Japanese machinery and equipment products are fairly sensitive to the trends in cost competitiveness – the cost elasticities vary between –0.8 and –1.6.

Time trends enter significantly in nine of the industry equations, implying an average trend growth of 5.3 per cent. This is considerably larger than the coefficient in the pooled regression equation. The time-series regressions, in addition to picking up the influence of the trend changes in the quality of Japanese products and the catch-up phenomenon, might also be capturing the positive effects of growing economic integration and intra-firm trade between Canada and Japan – especially the influence on trade of Japanese foreign investment in Canada.

The trends in Canada's imports from Japan are also significantly influenced by changes in Canadian capacity utilization in four manufacturing industries: transportation equipment; textiles, clothing, and leather products; lumber and furniture; and rubber and plastic products. However, the coefficient has the expected positive sign only for rubber and plastic products. In the other three industries the coefficient is negative, indicating that an increase in Canadian capacity utilization should reduce import penetration in the three industries.

Canada's Imports from the European Community

Pooled Regression Equation

The trends in both the industry structure and the level of Canadian manufactured imports from the European Community are significantly influenced by tariff barriers, foreign direct-investment linkages, relative unit labour costs, comparative advantage, and the time trend. Unlike imports from the United States and Japan, tariff barriers significantly restrain Canada's imports from the European Community (Table 14).

As with Canada's exports to the European Community, Canadian imports from this region are significantly influenced by trends in relative unit labour costs. Moreover, the size of the cost elasticity is fairly large (–0.63). The coefficient on the time trend implies an average trend growth of 2.2 per cent per year for the value of exports by the EC countries to Canada, in sharp contrast to the negative trend growth for Canada's exports to the European Community. This difference in the two trend growth rates could be partly attributed to the catch-up process in the EC countries.

As expected, import penetration is lower in the resource-based manufacturing industries. In addition, Canada has a strong comparative advantage in petroleum and coal products and rubber and plastic products. On the other hand, the European Community has a strong advantage in textiles, clothing, and leather products, nonelectrical machinery, chemical and chemical products, nonmetallic mineral products, and fabricated metal products.

Time-Series Regressions

The industry equations are in line with the pooled regression results. The coefficients on the time trend imply an average trend growth of 1.7 per cent per year, not too different than the estimate in the pooled equation (Table 17). The coefficient is positive and highly significant in nine industries, giving growth rates that vary from 1.6 per cent to 10 per cent.

In all the equations, the unit labour costs of the European Community relative to those of Canada have an important explanatory role. The long-term cost elasticities range from –0.18 in the food, beverages, and tobacco industry to –2.47 in the lumber and furniture industry, with a trade weighted average of –0.69, similar to the estimate in the pooled regression.

Canadian capacity utilization significantly influences Canada's imports from the EC countries in four industries: paper and publishing; transportation equipment; textiles, clothing, and leather products; and rubber and plastic products.

Canada's Imports from the Asian NICs

Pooled Regression Equations

The level and the industry structure of Canadian manufactured imports from the Asian NICs are explained by nontariff barriers, comparative advantage, Canada's total import level, and a time trend (Table 14).[11] As with Japanese exports to Canada, Canadian manufactured imports from the Asian NICs are considerably restrained by Canadian nontariff barriers, presumably due to Canada's quantitative restrictions on textiles, clothing, and leather products, electrical machinery, and automobiles.

The coefficient on the time trend is positive and highly significant. It implies that Canada's imports from the NICs grew at a quite substantial trend rate of 18.2 per cent per year in the period considered. This likely reflects a catch-up phenomenon as the Asian NICs have become increasingly industrialized while remaining highly cost competitive.

As expected, the coefficient on the comparative advantage variable is negative and significant. In addition to this general result, the import penetration of the Asian NICs into Canada is substantially lower in nonelectrical machinery, transportation equipment, petroleum and coal products, and chemicals and chemical products. On the other hand, the Asian NICs have a strong advantage in textiles, clothing, and leather products and electrical machinery.

Time-Series Regressions

In 13 of the 14 industry equations the trend term enters significantly and is positive and quite large, with the exception of the lumber and furniture industry. Trend growth rates vary from 8.4 per cent in textiles, clothing, and leather products to 45 per cent in the transportation equipment industry, with a trade weighted average of 11.5 per cent. These findings are similar to the pooled regression results.

The relative cost variables enter significantly only in half of the equations. But the size of the cost elasticities is fairly large, varying from –0.91 to –4.6, suggesting that imports from the Asian NICs are fairly sensitive to changes in relative costs. Costs relative to those of Japan are especially important – the weighted average of these long-term cost elasticities is –1.1.

Imports from the Asian NICs are significantly influenced by Canadian capacity utilization rates in seven manufacturing industries. In four industries the coefficient has the expected positive sign, while in the other three it has a negative sign.

Conclusion

The trends in Canadian manufactured exports to, and imports from, the four regions are largely explained by the trends in domestic and foreign costs, demand and noncost factors (product quality, the catch-up phenomenon, economic integration, investment linkages, etc.), and capacity utilization rates. There is also some evidence that real exchange rate variability has a negative impact on trade flows. The industry structure of trade flows is mainly determined by the structure of the tariff and nontariff barriers at home and abroad, investment linkages, and the comparative advantage position of Canada and its trading partners.

Both the trends and the structure of Canada's exports to the United States, its largest trading partner, are largely influenced by the trends in U.S. apparent consumption, Canada's unit labour costs (relative to the United States), and noncost factors (trend growth). The structure of Canada's imports from the United States appears to be more influenced by noncost factors than by cost factors. However, the trends in Canadian imports from the United States are mainly determined by Canada's apparent consumption, U.S. costs relative to those of Canada and third-country competitors in Canada, and trend growth. In addition, the trends in the Canadian capacity utilization rates have a significant influence on imports.

The same set of variables determine Canada's exports and imports of manufactured products to and from Japan, the European Community, and the Asian NICs. However, the regression results strongly suggest that future growth in Canadian imports from these three regions is likely to considerably exceed the growth in Canadian exports to them, unless Canada substantially improves its cost position and/or their demand grows at a much faster pace than Canadian demand. This reflects the fact that the estimated trend growth in imports from these regions is very large (total manufacturing trend growth varies between 1.7 and 11.5 per cent), whereas the trend growth in exports is negative (it varies from 0.4 to –1.9 and –1.8 per cent).

Sources of Changes in Canada's Trade Flows

In the previous section we discussed the empirical results regarding the determinants of Canada's trade flows and trade patterns. In this section we use the estimated coefficients of the regression equations and the percentage change in the independent variables to quantify the importance of cost and noncost factors (investment linkages, economic integration, the catch-up phenomenon, capacity utilization, etc.) in the determination of the trends in Canadian manufactured exports and imports, disaggregated by the four regions.

The three main objectives of this section are as follows: 1) to estimate the sources of growth in exports and imports of Canada's manufacturing industries during the period 1971-86, disaggregated by region; 2) to quantify the importance of the cost and noncost factors in the determination of the substantial changes in Canadian trade patterns in the period 1980-85; and 3) to examine the medium-term consequences for trade of the large deterioration in the cost position of the Canadian industries vis-à-vis their U.S. competitors over the period 1985-90.

Sources of Growth in Canada's Manufactured Exports and Imports: 1971-86

Using the coefficients of the industry export and import penetration equations, and the percentage change in the independent variables, we quantified the sources of growth in exports and imports of Canada's manufacturing industries over the period 1971-86, disaggregated by the four regions. Thus the growth in Canadian exports is equal to the growth in foreign apparent consumption plus the contribution of cost factors, capacity utilization, and trend growth. Similarly, the sources of growth in Canadian imports are computed in the same way using Canada's apparent consumption. These results are recorded in Tables 19 to 26 and Figures 8 and 9. In these tables, the effects of capacity utilization are combined with the relative cost effects.

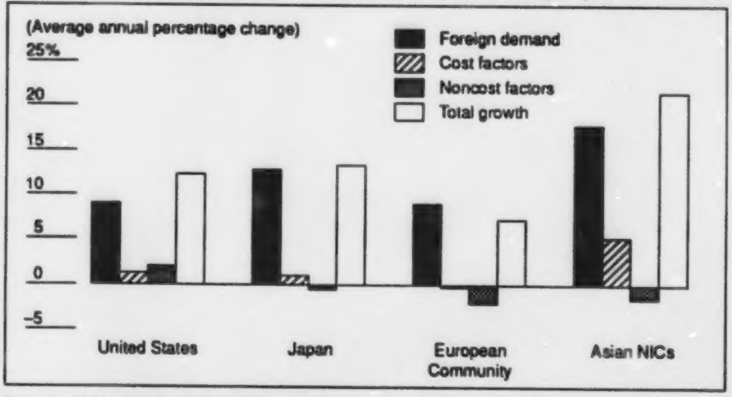
Exports

The value of Canada's manufactured exports to the United States grew at an average annual rate of 12.4 per cent during the period 1971-86, and rising U.S. apparent consumption accounted for almost 75 per cent of this growth. Trend growth (the influence of economic integration and intra-firm trade between the two countries) contributed about 15 per cent, with the remainder contributed by changes in relative unit labour costs and U.S. capacity utilization rates (Figure 8).

Growth in apparent consumption also played a dominant role in the determination of the growth in the value of Canada's manufactured exports to Japan, the European Community, and the Asian NICs over the period 1971-86 (Figure 8). In fact, the contribution of apparent consumption significantly exceeded the growth in manufactured exports to the European Community – cost factors and the negative influence of the growth in intra-regional trade

Figure 8

Determinants of the growth in Canadian manufacturing exports, 1971-86



Source Estimates by the authors, based on data from Statistics Canada.

and the catch-up phenomenon contributed negatively to the growth in Canadian exports to this region.

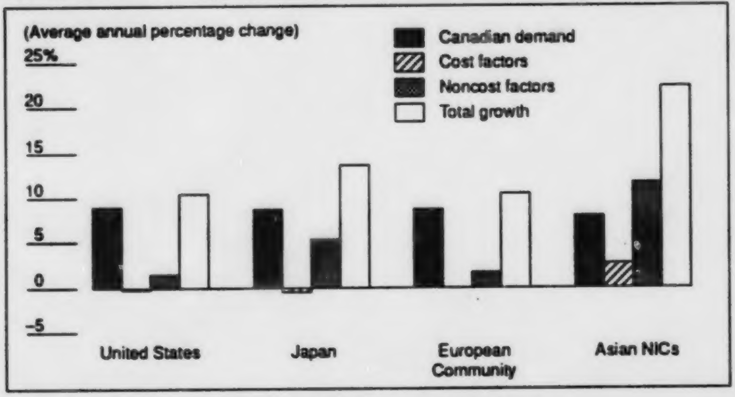
Cost factors significantly influenced the *pattern* of Canadian exports to all regions during the period 1971-86 (Tables 19 to 22). For instance, a deterioration in Canadian cost competitiveness considerably restrained the growth in Canada's exports to the United States in nonelectrical and electrical machinery. On the other hand, cost factors provided a substantial stimulus to exports to the United States in transportation equipment and rubber and plastic products.

Imports

As with exports, cost factors on average played a minor role in the determination of the growth in Canadian manufactured imports from the four regions during the period 1971-86 (Figure 9). But, as was also the case with exports, the industry composition of imports was significantly influenced by the cost variables (Tables 23 to 26).

The value of Canada's manufactured imports from the United States increased by an average of 10.3 per cent per year during the period. Almost 90 per cent of this growth originated in the growth of Canadian apparent consumption. The contribution of other noncost factors (such as the influence of growing economic integration and intra-firm trade) accounted for about 15 per

Figure 9
Determinants of the growth in Canadian manufacturing imports, 1971-86



SOURCE Estimates by the authors, based on data from Statistics Canada.

cent, while changes in cost factors and Canadian capacity utilization rates had a slight negative impact. Similarly, the contribution of cost and capacity utilization effects to the average growth in imports from the other three regions was negligible.

The results for both exports and imports imply that temporal variations in cost factors will even out in the long term, presumably because changes in cost competitiveness will induce offsetting changes in the real exchange rate and real wages later on. Thus what matters most in the long run for the overall level of trade are demand changes. Nevertheless, changes in cost competitiveness do influence the pattern of trade, even in the long run.

Determinants of the Changes in Canada's Trade Patterns in the 1980s

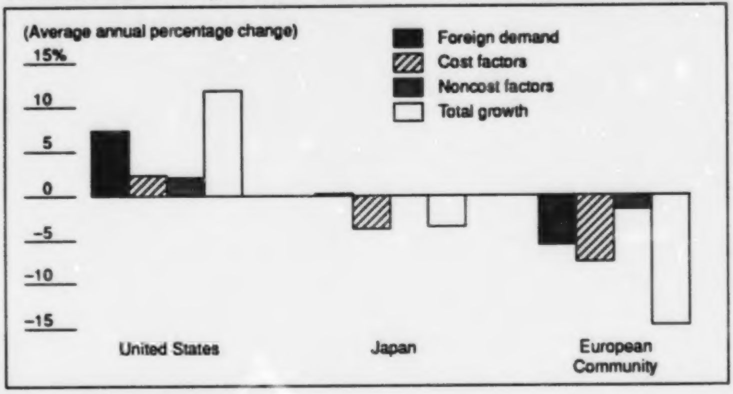
Earlier we noted that the dependence of Canadian manufactured exports on the U.S. market increased substantially during the first half of the 1980s. In the same period, the importance of the United States in Canadian imports declined significantly. In this subsection we analyse the causes of these changes by computing the sources of growth in Canadian manufactured exports and imports during the period 1980-85, disaggregated by the four regions. The results are shown in Tables 27 to 34 and Figures 10 and 11.

Exports

Canada's manufactured exports to the United States grew by 13.1 per cent per year during the period 1980-85, compared with the total export growth rate of 8.3 per cent (Table 27). Consequently, the share of Canada's exports to the United States in total Canadian manufactured exports increased considerably. Our analysis implies that the growth in U.S. apparent consumption, enhanced Canadian cost competitiveness, and the influence of noncost factors other than apparent consumption all contributed to this strong growth (Figure 10). The contribution was fairly large in the textiles and transportation equipment industries – it accounted for over one third of the growth in their exports to the United States. On the other hand, the relative cost changes considerably reduced the growth in Canada's exports to the United States in paper and publishing, chemicals and chemical products, and nonelectrical machinery.

The value of Canada's manufactured exports to Japan and the European Community declined significantly during the period 1980-85 (Tables 28 and 29, and Figure 10). Exports to Japan declined at annual rate of 3.2 per cent, as a result of a deterioration in Canada's cost position in relation to Japan. This was only slightly offset by the small growth in Japanese apparent

Figure 10
Determinants of the growth in Canadian manufacturing exports, 1980-85



SOURCE Estimates by the authors.

consumption. Exports to the European Community declined at an annual average rate of 10.9 per cent, much of which was accounted for by a deterioration in Canada's cost position relative to the EC countries.

Canada's manufacturing exports to the Asian NICs increased by a mere 0.1 per cent per year during the period 1980-85. Our estimates show that improved Canadian cost competitiveness contributed positively to the growth in exports – over 3 per cent per year. However, large shifts in the industry composition of the apparent consumption in the Asian NICs (shifts not matched by changes in Canada's export pattern) and negative trend growth (reflecting the catch-up phenomenon and growing intra-trade within the Asia/Pacific region) more or less offset the positive impact of relative movements (Table 30).

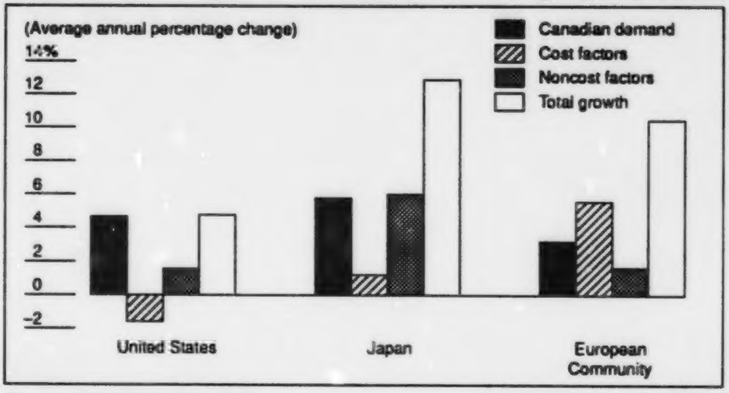
Imports

Canada's manufactured imports from the United States increased at an annual rate of 6.7 per cent during the period 1980-85, compared with the total import growth of 7.4 per cent (Table 31 and Figure 11). Our results imply that the deterioration in U.S. cost competitiveness in relation to third countries (Japan and the European Community) reduced the growth rate of U.S. exports to Canada by about 1 per cent per year.

In contrast, cost factors contributed very little to the average growth in Canada's manufacturing imports from Japan (Figure 11). Growth in Cana-

Figure 11

Determinants of the growth in Canadian manufacturing imports, 1980-85



SOURCE Estimates by the authors.

dian apparent consumption and the impact of other noncost factors contributed equally. The value of imports from the European Community increased at an annual rate of 8 per cent during the period 1980-85. Over half of this growth was the result of the improved cost position of its industries in relation to their Canadian counterparts (Table 33).

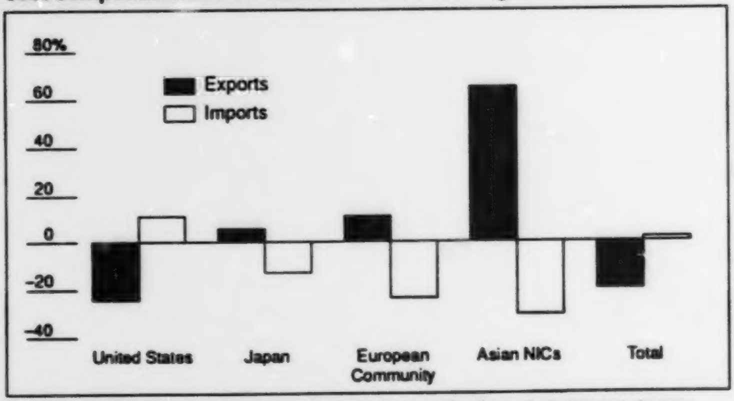
On average, the deterioration in the cost competitiveness of the Asian NICs vis-à-vis Japan reduced the growth in Canadian manufacturing imports from these countries by 4.8 per cent per year. The impact of the growth in Canada's total imports (demand effect) and the trend growth (the influence of the catch-up phenomenon) overwhelmed the negative cost effect, resulting in a substantial increase in imports from these countries (Table 34).

Implications of the Recent Deterioration in Canada's Cost Competitiveness

As previously noted, Canada's cost position in manufacturing deteriorated by about 40 per cent vis-à-vis the U.S. industry in the period 1985-90, and this deterioration is pervasive across all the two-digit manufacturing industries. However, between 1985 and 1990 Canada significantly improved its cost position relative to Japan, the European Community, and the Asian NICs. In this section we use the cost elasticities reported previously to estimate the medium-term impact of these recent relative cost changes on the exports and imports of Canadian manufacturing industry. Because of the long lead-lag relationship between costs, prices, and trade flows, the full impact of these changes will not be felt for up to five years, that is, not until 1994. It should be noted here that these estimates are partial effects. They represent only the impact of changes in costs and thus exclude the impact of changes in demand, the feedback effects of changes in real income and the exchange rate, and other influences. Although partial in nature, these estimates illustrate how much impact relative cost movements can have on trade flows.

The estimated impacts on trade flows indicate that Canadian manufacturing industries are being subjected to considerable adjustment pressures and will continue to face such difficulties while their costs remain so much greater than those in the United States (Figure 12; Tables 35 and 36). The deterioration in Canadian cost competitiveness in the U.S. market could, on average, reduce domestic manufactured exports to that country by about 25 per cent by 1994, compared with a situation in which no changes in relative costs had occurred (the base case). However, Canada's exports to Japan, the European Community, and the Asian NICs will increase significantly because of improvements in Canadian costs relative to these countries. But the U.S. market currently accounts for about 85 per cent of total Canadian manufactured exports to the four region, so the net impact of these relative cost changes is still quite large (a 20-per-cent reduction in exports to the four regions by 1994).

Figure 12
Hypothetical effects (by 1994) of recent changes in cost competitiveness on Canada's manufacturing trade[1]



[1] The impacts shown here represent only direct (first round) effects of relative cost changes in the 1985-90 period. They do not take into account changes in demand, the feedback effects of changes in real incomes or the exchange rate, the effects of relative cost changes after 1990, or the effects of any other factor that influences Canada's trade.

SOURCE Estimates by the authors.

The overall impact of the costs changes on Canadian manufactured imports, however, is expected to be relatively small (1.6 per cent). In this case the significant increase in imports from the United States is offset in large part by a fall in imports from the other three regions (Table 35). These estimates of a large export fall and an increase in imports indicate the serious consequences of large losses in cost competitiveness. Some industries could be hit particularly hard. For example, the adjustment problems will be particularly acute for the following industries: food, beverages, and tobacco; nonmetallic mineral products; transportation equipment; and textiles, clothing, and leather products (Table 36).

The estimated changes in exports and imports in conjunction with the level of manufactured exports and imports in 1989, imply a deterioration in Canada's trade balance manufactured goods of US$24 billion (per year). A sustained slowdown in U.S. apparent consumption, due to serious structural imbalances in that country, would compound the adjustment difficulties for Canadian manufacturing industries. Moreover, the estimated trend growth rates in the export and import equations, discussed in the previous two sections, imply growing deficits in manufactured products trade vis-à-vis Japan, the European Community, and the Asian NICs.

Conclusions and Policy Implications

The main objective of this paper has been to provide an econometric analysis of the linkages between productivity, costs, and trade performance for Canadian industries. The following are the some of the major results of this study:

- Canada's cost competitiveness declined considerably in manufacturing vis-à-vis the United States between 1985 and 1990. This deterioration was pervasive across all broadly defined manufacturing industries.

- The value of the Canadian dollar in terms of the U.S. dollar was the same in 1980 and 1990. The cost deterioration between those two years was due primarily to higher inflation and poorer productivity growth in Canada. However, the large appreciation of the Canadian dollar in the period 1986-90 certainly added to the difficulties faced by manufacturers in that period.

- Canada's cost competitiveness in relation to Japan, the major EC countries, Taiwan, and South Korea improved in the period 1985-90, largely because of the depreciation of the Canadian dollar relative to the currencies of those countries.

- Canada's trade is dominated by its relationship with the United States. That country became more important as an export market in the 1980s, but it supplied a declining share of imports as exporters from Japan and the Asian NICs gained ground in the Canadian market.

- Canada's trading relationship with the United States is much more diversified than with other regions. Canada's exports of manufactured goods to the United States include large amounts of both resource-based manufactures and higher value-added manufactures, especially transportation equipment. Canada imports a large measure of manufactures, but it increasingly imported a greater proportion of nonmanufactured goods over the 1980s.

- In contrast, Canada's exports to areas other than the United States are chiefly resources or resource-related manufactures. And Canada's imports from the Asian NICs and Japan are almost exclusively manufactured goods, largely machinery and equipment. Canada's imports from the European Community can be broadly characterized as somewhat more diversified than is the case with Japan or the Asian NICs.

- The trends in Canadian manufactured exports and imports from the four regions are largely explained by the trends in domestic and foreign costs, foreign and domestic demand (apparent consumption), noncost factors (investment linkages, economic integration, product quality, intra-regional trade, the catch-up phenomenon, etc.), and capacity utilization. There is also some evidence that real exchange rate variability has a small negative impact on trade flows.

- The industry structure of trade flows is mainly determined by the structure of tariff and nontariff barriers at home and abroad, the comparative advantage position of Canada and its trading partners, and investment linkages.

- The analysis suggests that future growth in Canada's manufactured imports from Japan, the Asian NICs, and the European Community will considerably exceed the growth in Canadian manufactured exports to them, unless Canada substantially improves its cost position and/or their demand grows at a much faster pace than Canadian demand.

- Growth in Canadian manufactured exports and imports in the long term is mainly determined by growth in demand. The results for both exports and imports imply that temporal variations in the cost factors even out over the long haul, because changes in cost competitiveness induce offsetting changes in the real exchange rate (terms of trade) and real wages later on. However, cost competitiveness does play a large role in export and import flows in the shor term.

- Canadian trade with the United States has been enhanced by the growing influence of intra-firm trade and economic integration between the two countries on their trade flows. Integration in the European Community and the Asia/Pacific region has had a negative influence on exports to these regions.

- Although cost factors play only a minor role in the determination of Canadian exports in the longer term, the industry structure of Canada's manufacturing trade is significantly influenced by cost factors both in the long and the short terms.

The estimated trade impacts of the recent changes in Canada's cost position imply that manufacturing industries face significant difficulties over the medium term. A slowdown in U.S. apparent consumption, due to the large structural imbalances in that country, could exacerbate the adjustment difficulties facing Canadian industries. Furthermore, the analysis implies growing trade deficits in manufactured products vis-à-vis Japan, the European Community, and the Asian NICs. All of this suggests that a marked deterioration in Canada's current account balance could occur over the medium term, representing a major adjustment problem for the Canadian economy. In the long term, however, a combination of the following macroeconomic adjustments could correct the trade problem:

- a marked depreciation of the real exchange rate (trade weighted);
- a large increase in foreign indebtedness;
- a significant reduction in the growth rate of Canada's apparent consumption *relative* to the growth in other countries;
- a large increase in resource exports; and
- an increase in Canadian productivity levels relative to those of our trading partners.

The first four avenues will reduce the real income of Canadians relative to other countries because of the unfavourable impact on the terms of trade, real wages, and net foreign income flows. The fifth solution, however, will correct the trade problem without adversely affecting real income. It is most likely that a combination of some real income loss and an improvement in relative productivity will occur.

The medium-term adjustment difficulties as well as the long-term real income losses could be significantly reduced by substantially altering the current Canadian fiscal and monetary policy mix. Tighter fiscal policy (both federal and provincial) would facilitate lower interest rates and a lower value for the Canadian dollar without increasing inflation, and it would improve Canada's cost position [Courchene 1990].

Of course, public policy must also address the longer-term productivity and cost performance problems of Canada. In another study [Rao and Lemprière 1992*a*], we identify the failure of Canadian industry to react quickly and flexibly to competitive pressures and relative input-price shocks as a major source of Canada's competitiveness problems. Policies that effectively encourage productivity improvements and increase price-wage flexibility must be devised. Otherwise Canada could suffer a substantial loss in real income as adjustments are forced upon the country over the long run.

Table 1

Factors contributing to the difference between Canadian and U.S. unit labour costs, 1980-90

	1980-85	1985-90	1980-90
		(Per cent)	
Difference in:			
Productivity growth[1] (1)	5.5	–14.7	–11.2
Nominal hourly compensation growth[1] (2)	15.0	5.8	26.8
Change in exchange rate[2] (3)	–14.4	17.0	0.2
Difference in unit labour cost growth[3]			
Estimated (2) + (3) – (1)	–4.9	37.5	38.2
Actual	–10.5	41.9	33.5

[1] A negative (positive) sign indicates slower (faster) growth in Canada than in the United States.

[2] A negative (positive) sign indicates a depreciation (appreciation) of the Canadian dollar vis-à-vis the U.S. dollar.

[3] The estimated difference in unit labour cost growth does not match the actual difference due to interaction terms.

Source: Estimates by the authors, based on data from the U.S. Bureau of Labor Statistics and the Bank of Canada.

Table 2

Factors contributing to the difference between Canadian and Japanese unit labour costs, 1980-90

	1980-85	1985-90	1980-90
		(Per cent)	
Difference in:			
Productivity growth[1] (1)	–1.7	–21.5	–27.9
Nominal hourly compensation growth[1] (2)	24.9	4.5	37.2
Change in exchange rate[2] (3)	–10.1	–28.7	–35.9
Difference in unit labour cost growth[3]			
Estimated (2) + (3) – (1)	16.5	–2.6	29.2
Actual	9.6	–10.2	–1.8

[1] A negative (positive) sign indicates slower (faster) growth in Canada than in Japan.

[2] A negative (positive) sign indicates a depreciation (appreciation) of the Canadian dollar vis-à-vis the Japanese yen.

[3] The estimated difference in unit labour cost growth does not match the actual difference due to interaction terms.

Source: Estimates by the authors, based on data from the U.S. Bureau of Labor Statistics and the Bank of Canada.

Table 3

Factors contributing to the difference between Canadian and German unit labour cost, 1980-90

	1980-85	1985-90	1980-90
		(Per cent)	
Difference in:			
Productivity growth[1] (1)	5.2	–10.1	–6.3
Nominal hourly compensation growth[1] (2)	18.2	–0.2	22.8
Change in exchange rate[2] (3)	37.8	–35.3	–10.9
Difference in unit labour cost growth[3]			
Estimated (2) + (3) – (1)	50.8	–25.4	18.2
Actual	57.0	–33.0	8.5

1 A negative (positive) sign indicates slower (faster) growth in Canada than in Germany.

2 A negative (positive) sign indicates a depreciation (appreciation) of the Canadian dollar vis-à-vis the German Deutschmark.

3 The estimated difference in unit labour cost growth does not match the actual difference due to interaction terms.

Source Estimates by the authors, based on data from the U.S. Bureau of Labor Statistics and the Bank of Canada.

Table 4

Comparison of unit labour costs in manufacturing, Canada and selected countries, 1980, 1985, and 1990

	1980	1985	1990
		(Canada = 100)	
United States	94.0	103.3	73.6
Japan	90.2	81.8	91.4
Germany	119.1	76.7	111.5
France	135.6	89.6	103.5
Italy	94.4	66.9	89.6
United Kingdom	146.3	90.1	102.9
South Korea	30.7	29.9	30.7*
Taiwan	27.6	31.7	35.5*

*Data for 1988.

Source Estimates by the authors, based on data from the U.S. Bureau of Labor Statistics and the Bank of Canada.

Table 5

Comparison of unit labour costs in manufacturing, Canada and the United States, 1980, 1985, and 1990

	1980	1985	1990
		(Canada = 100)	
Food, beverages, and tobacco	85.4	90.8	64.9
Paper and allied products	92.9	85.7	62.4
Chemicals and chemical products	97.3	111.9	71.3
Nonmetallic mineral products	120.4	124.4	87.4
Primary metal products	90.1	116.4	85.8
Fabricated metal products	93.4	102.9	61.5
Nonelectrical machinery[1]	158.3	106.8	55.7
Electrical machinery[1]	78.7	116.2	89.8
Transportation equipment	103.5	127.2	99.0
Textiles	101.7	112.9	87.7
Clothing	89.7	108.5	78.9
Lumber and wood products	63.0	93.5	62.8
Furniture and fixtures	93.5	109.8	73.5
Printing and publishing	86.0	96.4	72.0
Rubber and plastics	84.8	92.0	55.8
Leather and leather products	70.6	88.2	63.4
Miscellaneous manufactures	80.4	92.6	58.1
Total manufacturing	94.0	103.3	73.6

[1] In the U.S. data, computers are included in nonelectrical machinery, while in the Canadian data they are included in electrical machinery.

Source: Estimates by the authors, based on data from the U.S. Bureau of Labor Statistics, the OECD, and Statistics Canada.

Table 6

Factors contributing to the growth of nominal hourly compensation, Canada, United States, Japan, and Germany, 1980-90

	Growth of nominal hourly compensation	Contribution of: Consumer price inflation	Real wage growth[1]	Payroll taxes
	(Per cent)			
Canada				
1980-85	48.6	42.9	3.5	2.2
1985-90	26.8	24.5	1.5	0.8
1980-90	88.4	77.8	7.6	3.0
Canada minus United States				
1980-85	15.0	12.3	1.4	1.3
1985-90	5.8	3.0	1.9	0.9
1980-90	26.8	19.2	5.3	2.3
Canada minus Japan				
1980-85	24.9	28.2	–4.1	0.8
1985-90	4.5	17.6	–13.9	0.8
1980-90	37.2	55.2	–19.6	1.6
Canada minus Germany				
1980-85	18.2	22.0	–4.8	1.0
1985-90	–0.2	17.5	–18.5	0.8
1980-90	22.8	48.4	–28.6	1.8

[1] Estimated as the residual not accounted for by consumer price inflation and payroll taxes changes.

Source: Estimates by the authors, based on data from the U.S. Bureau of Labor Statistics, Statistics Canada, and the International Monetary Fund.

Table 7a

Share in Canada's manufacturing exports and growth in exports, by industry, for country/region importers, 1971-89

	Importer	Share					Share growth,[1] 1971-89	Export growth,[1] 1971-89
		1971	1976	1981	1986	1989		
					(Per cent)			
Food, beverages, and tobacco	United States	4.0	2.8	3.0	2.8	2.6	–2.4	8.7
	Japan	19.7	23.7	20.1	14.9	11.1	–3.1	11.6
	European Community (12)	7.5	6.5	6.5	4.0	2.6	–5.8	2.7
	Asian NICs (4)	8.8	16.2	12.0	12.9	7.1	–1.2	20.1
	Rest of the world	10.5	7.9	8.2	6.4	4.9	–4.2	4.4
	Total	5.3	4.4	4.8	3.5	3.2	–2.9	8.0
Paper and publishing	United States	14.7	15.8	15.2	11.4	12.5	–0.9	10.4
	Japan	25.4	29.4	24.7	31.2	30.4	1.0	16.3
	European Community (12)	23.6	35.7	29.3	28.5	32.5	1.8	10.9
	Asian NICs (4)	32.6	19.0	20.4	16.4	20.3	–2.6	18.4
	Rest of the world	16.5	14.5	12.5	16.3	17.3	0.3	9.3
	Total	16.1	18.2	16.6	13.2	15.2	–0.3	10.8
Chemical products	United States	3.8	5.3	7.1	4.8	5.4	2.0	13.6
	Japan	8.8	7.3	11.3	12.0	9.5	0.5	15.7
	European Community (12)	6.3	5.5	14.2	14.0	6.7	0.3	9.3
	Asian NICs (4)	11.8	18.8	21.3	18.7	20.4	3.1	25.3
	Rest of the world	7.3	5.4	8.4	10.8	14.7	3.9	13.3
	Total	4.5	5.5	8.3	6.1	6.6	2.1	13.5
Petroleum products	United States	0.6	0.8	3.6	1.7	2.0	6.5	18.6
	Japan	–	0.3	0.7	0.9	0.9	25.9	45.0

Table 7a (cont'd.)

	Importer	Share 1971	1976	1981	1986	1989	Share growth,[1] 1971-89	Export growth,[1] 1971-89
					(Per cent)			
	European Community (12)	0.1	0.5	2.4	0.6	0.4	8.5	18.3
	Asian NICs (4)	–	–	–	0.3	0.3	–	–
	Rest of the world	0.2	1.6	2.4	0.8	0.9	7.9	17.6
	Total	0.5	0.8	3.2	1.5	1.7	6.8	18.7
Nonmetallic mineral products	United States	0.5	0.5	0.8	0.8	1.0	3.4	15.2
	Japan	0.2	0.2	0.1	0.1	0.2	–0.8	14.2
	European Community (12)	0.4	0.5	0.5	0.5	0.7	3.7	13.0
	Asian NICs (4)	0.4	0.5	0.5	0.3	1.0	5.6	28.4
	Rest of the world	0.6	0.8	0.6	0.4	0.7	0.9	10.0
	Total	0.5	0.5	0.7	0.8	0.9	3.2	14.7
Primary metal products	United States	10.0	9.8	10.8	7.2	7.4	–1.7	9.6
	Japan	19.1	7.0	13.8	9.3	11.8	–2.7	12.1
	European Community (12)	32.3	18.1	11.8	9.1	11.4	–5.6	2.9
	Asian NICs (4)	13.1	19.0	16.6	18.5	21.4	2.8	24.9
	Rest of the world	16.4	12.1	7.7	7.2	11.6	–1.9	6.9
	Total	13.2	10.9	10.7	7.5	8.5	–2.5	8.5
Fabricated metal products	United States	1.2	1.3	1.8	1.6	2.0	3.0	14.7
	Japan	0.8	0.9	0.9	1.1	0.3	–6.0	8.3
	European Community (12)	1.0	1.1	1.4	1.2	1.3	1.1	10.2
	Asian NICs (4)	1.7	1.3	2.1	0.8	0.9	–3.7	17.1
	Rest of the world	2.1	4.4	2.7	2.1	2.2	0.2	9.3
	Total	1.2	1.6	1.9	1.6	1.8	2.3	13.7

Nonelectrical machinery	United States	10.4	11.1	10.8	7.6	9.5	–0.5	10.8
	Japan	4.0	1.1	1.4	1.1	1.3	–6.0	8.3
	European Community (12)	5.2	5.4	6.1	9.6	9.9	3.6	12.9
	Asian NICs (4)	11.1	5.9	7.6	4.3	4.6	–4.8	15.7
	Rest of the world	11.0	13.7	12.4	17.1	13.2	1.0	10.0
	Total	9.8	10.5	10.2	8.2	9.3	–0.3	10.9
Electrical machinery	United States	3.7	3.2	5.3	5.4	7.3	3.8	15.6
	Japan	2.1	3.8	2.0	2.6	2.0	–0.2	15.0
	European Community (12)	4.5	4.4	7.1	8.8	10.2	4.7	14.1
	Asian NICs (4)	6.4	12.5	8.2	11.5	8.6	1.6	23.5
	Rest of the world	6.7	8.5	5.9	9.0	9.3	1.8	11.0
	Total	4.1	4.0	5.5	5.9	7.5	3.4	15.0
Transportation equipment	United States	39.1	37.7	30.4	44.4	39.0	–	11.4
	Japan	0.2	0.6	0.6	1.4	1.6	13.6	30.8
	European Community (12)	3.7	4.6	3.5	6.1	5.7	2.4	11.6
	Asian NICs (4)	8.7	1.0	1.6	2.8	6.0	–2.1	19.0
	Rest of the world	17.6	21.6	28.1	18.7	13.3	–1.6	7.3
	Total	32.3	31.2	26.0	39.0	32.8	0.1	11.3
Textiles, clothing, and leather	United States	1.4	0.8	0.9	1.1	1.1	–1.3	10.0
	Japan	0.4	1.0	1.2	0.7	0.5	0.7	16.0
	European Community (12)	3.5	3.0	3.2	2.3	2.0	–3.0	5.7
	Asian NICs (4)	3.4	1.9	4.9	3.8	4.4	1.3	23.1
	Rest of the world	3.6	3.3	3.5	3.1	3.3	–0.5	8.4
	Total	1.8	1.3	1.6	1.4	1.4	–1.6	9.4
Lumber and furniture	United States	8.2	7.8	6.7	7.3	6.6	–1.2	10.0
	Japan	15.8	22.9	21.5	22.4	28.4	3.3	19.0
	European Community (12)	8.0	10.2	10.1	10.5	11.9	2.2	11.4
	Asian NICs (4)	0.2	0.1	0.9	1.2	1.9	13.8	38.4
	Rest of the world	3.1	2.4	3.4	2.6	4.3	1.7	10.8
	Total	7.8	7.8	7.0	7.5	7.5	–0.2	11.0

Table 7a (concl'd.)

	Importer	Share 1971	1976	1981	1986	1989	Share growth,[1] 1971-89	Export growth,[1] 1971-89
					(Per cent)			
Plastic and rubber products	United States	0.7	1.4	1.6	1.8	1.8	5.8	17.9
	Japan	1.1	0.3	0.7	0.7	0.4	–6.1	8.3
	European Community (12)	1.1	0.7	0.7	0.4	0.5	–4.1	4.5
	Asian NICs (4)	0.3	0.8	1.7	3.1	0.9	6.1	28.9
	Rest of the world	1.5	1.0	1.4	2.5	1.6	0.5	9.5
	Total	0.8	1.3	1.5	1.8	1.6	4.1	15.7
Miscellaneous manufactures	United States	1.6	1.6	1.8	1.9	1.9	0.9	12.4
	Japan	2.3	1.3	1.0	1.5	1.7	–1.9	13.0
	European Community (12)	2.8	3.8	3.3	4.4	4.1	2.0	11.2
	Asian NICs (4)	1.5	3.0	2.2	5.4	2.5	2.9	25.1
	Rest of the world	2.8	2.8	2.9	3.0	2.9	0.1	9.1
	Total	1.9	2.0	2.1	2.2	2.1	0.7	12.0
				(Millions of US$)				(Per cent)
Total manufacturing	United States	10,797	20,245	37,852	61,578	75,412	. . .	11.4
	Japan	278	690	1,704	1,744	3,540	. . .	15.2
	European Community (12)	1,513	2,884	5,413	4,062	7,098	. . .	9.0
	Asian NICs (4)	57	191	653	988	1,908	. . .	21.5
	Rest of the world	1,308	2,877	7,510	4,742	6,142	. . .	9.0
	Total	13,954	26,887	53,132	73,115	94,100	. . .	11.2

[1] Compounded annual average growth rates.

Source Estimates by the authors, based on data from Statistics Canada.

Table 7b

Share in Canada's total exports and growth in exports, by major sector, for country/region importers, 1971-89

	Importer	Share					Share growth,[1] 1971-89	Export growth,[1] 1971-89
		1971	1976	1981	1986	1989		
					(Per cent)			
Total manufacturing	United States	82.6	75.0	73.7	83.5	84.4	0.1	11.4
	Japan	31.6	27.1	39.1	36.5	45.0	2.0	15.2
	European Community (12)	54.5	59.4	62.4	64.3	70.6	1.4	9.0
	Asian NICs (4)	71.0	76.2	66.3	61.2	56.2	−1.3	21.5
	Rest of the world	57.2	58.4	58.3	55.0	57.8	0.1	9.0
	Total	73.1	68.0	67.9	76.9	77.6	0.3	11.2
Total non-manufacturing	United States	17.4	25.0	26.4	16.5	15.6	−0.6	10.6
	Japan	68.4	72.9	60.9	63.5	55.0	−1.2	11.6
	European Community (12)	45.5	40.6	37.6	35.7	29.4	−2.4	4.8
	Asian NICs (4)	29.0	23.8	33.7	38.8	43.8	2.3	26.0
	Rest of the world	42.8	41.6	41.7	45.0	42.2	−0.1	8.8
	Total	26.9	32.0	32.1	23.0	22.4	−1.0	9.7
				(Millions of US$)				(Per cent)
All industries	United States	13,074	26,906	51,395	73,711	89,332	...	11.3
	Japan	880	2,546	4,354	4,774	7,870	...	12.9
	European Community (12)	2,776	4,856	8,673	6,314	10,057	...	7.4
	Asian NICs (4)	80	251	986	1,613	3,396	...	23.1
	Rest of the world	2,285	4,925	12,888	8,618	10,622	...	8.9
	Total	19,095	39,564	78,295	95,030	121,277	...	10.8

1 Compounded annual average growth rates.

Source Estimates by the authors, based on data from Statistics Canada.

Table 8a

Share in Canada's manufacturing imports and growth in imports, by industry, for country/region exporters, 1971-89

	Exporter	Share					Share growth,[1] 1971-89	Import growth,[1] 1971-89
		1971	1976	1981	1986	1989		
					(Per cent)			
Food, beverages, and tobacco	United States	1.9	3.1	2.5	2.3	2.2	0.8	11.7
	Japan	0.3	0.1	0.1	0.1	0.2	–3.9	8.4
	European Community (12)	6.9	8.4	7.8	6.6	6.4	–0.4	10.1
	Asian NICs (4)	0.9	0.7	0.9	0.4	0.4	–4.1	17.3
	Rest of the world	29.1	29.2	24.0	15.7	15.7	–3.4	5.6
	Total	4.3	5.1	4.1	3.5	3.5	–1.2	9.2
Paper and publishing	United States	3.4	3.9	3.5	3.1	3.8	0.6	11.5
	Japan	0.5	0.3	0.3	0.4	0.6	1.7	14.8
	European Community (12)	2.6	2.7	2.3	2.5	3.0	0.9	11.6
	Asian NICs (4)	0.5	0.5	0.3	0.4	0.7	2.2	23.5
	Rest of the world	0.6	0.7	0.6	1.9	1.8	6.4	19.3
	Total	2.9	3.3	2.9	2.5	3.1	0.4	11.8
Chemical products	United States	6.6	6.4	7.4	6.5	7.3	0.6	11.5
	Japan	1.8	2.2	2.0	2.4	1.8	0.2	13.0
	European Community (12)	7.1	9.9	10.2	10.4	10.0	1.9	12.7
	Asian NICs (4)	0.7	0.4	1.0	1.5	1.4	4.1	25.6
	Rest of the world	4.7	4.7	5.7	5.5	4.8	0.1	12.3
	Total	6.2	6.3	7.0	6.3	6.7	0.4	11.8
Petroleum products	United States	0.7	0.5	0.7	1.2	1.1	2.1	13.1
	Japan	–	–	–	–	–	–	26.3

	European Community (12)	0.5	0.2	0.9	1.2	2.0	8.3	19.7
	Asian NICs (4)	–	–	0.2	0.3	0.2	–	–
	Rest of the world	13.6	4.7	3.9	4.2	6.0	–4.4	7.2
	Total	1.5	0.7	0.8	1.3	1.4	–0.3	11.0
Nonmetallic mineral products	United States	1.7	1.6	1.7	1.6	1.2	–1.7	9.0
	Japan	1.8	1.9	1.6	1.2	1.2	–2.5	10.0
	European Community (12)	3.8	4.2	4.3	3.8	3.9	0.2	10.8
	Asian NICs (4)	1.2	0.8	1.5	1.1	1.2	0.2	21.0
	Rest of the world	1.7	2.2	2.4	2.1	2.8	2.7	15.2
	Total	2.0	1.9	1.9	1.8	1.7	–0.9	10.3
Primary metal products	United States	4.4	3.9	3.8	2.2	3.3	–1.6	9.1
	Japan	15.4	9.2	10.6	2.7	2.4	–9.7	1.8
	European Community (12)	6.5	5.5	12.8	6.0	5.7	–0.8	9.7
	Asian NICs (4)	0.2	0.8	2.7	1.5	1.4	10.5	33.4
	Rest of the world	6.7	9.1	14.7	6.1	9.6	2.1	14.4
	Total	5.4	4.6	5.7	2.9	3.9	–1.8	9.3
Fabricated metal products	United States	2.9	2.9	3.1	2.0	2.6	–0.6	10.2
	Japan	3.9	4.4	2.5	1.4	1.6	–4.8	7.3
	European Community (12)	3.1	3.2	2.8	2.8	2.6	–0.9	9.6
	Asian NICs (4)	2.2	2.9	4.1	4.3	5.1	4.8	26.6
	Rest of the world	4.3	2.3	2.2	2.6	2.6	–2.8	9.0
	Total	3.1	3.0	3.0	2.2	2.7	–0.8	10.5
Nonelectrical machinery	United States	21.8	22.7	23.2	17.6	16.5	–1.5	9.1
	Japan	6.5	8.3	8.8	16.3	14.8	4.6	18.0
	European Community (12)	19.2	20.2	21.3	20.6	21.0	0.5	11.1
	Asian NICs (4)	0.6	1.0	2.9	3.4	4.6	12.1	35.4
	Rest of the world	9.7	12.6	12.9	15.6	15.2	2.5	14.9
	Total	19.4	20.4	20.8	17.0	16.1	–1.0	10.2
Electrical machinery	United States	9.2	8.6	11.3	14.2	17.1	3.5	14.7
	Japan	14.9	25.9	19.0	22.2	26.2	3.2	16.4

Table 8a (concl'd.)

	Exporter	Share 1971	Share 1976	Share 1981	Share 1986	Share 1989	Share growth,[1] 1971-89	Import growth,[1] 1971-89
					(Per cent)			
	European Community (12)	8.0	7.0	6.4	7.6	6.7	−1.0	9.5
	Asian NICs (4)	7.5	15.9	16.4	17.7	28.1	7.6	29.9
	Rest of the world	3.1	3.1	3.1	6.1	10.1	6.8	19.8
	Total	9.0	9.2	11.0	13.6	16.7	3.5	15.3
Transportation equipment	United States	34.9	33.1	29.9	39.3	32.7	−0.4	10.4
	Japan	26.5	26.6	38.6	39.8	37.9	2.0	15.0
	European Community (12)	14.5	11.3	11.0	15.3	18.7	1.4	12.2
	Asian NICs (4)	0.3	1.8	4.8	10.4	5.0	16.6	40.9
	Rest of the world	3.7	6.2	5.5	13.2	6.2	2.9	15.4
	Total	29.0	27.8	26.4	32.9	27.7	−0.3	11.1
Textiles, clothing, and leather	United States	3.6	4.0	3.2	1.9	2.2	−2.7	7.9
	Japan	14.6	7.6	3.1	2.5	1.5	−11.9	−0.6
	European Community (12)	15.9	13.4	9.0	11.7	8.9	−3.2	7.1
	Asian NICs (4)	56.4	53.4	41.2	37.1	30.4	−3.4	16.7
	Rest of the world	16.0	18.0	17.2	18.5	19.8	1.2	13.5
	Total	7.6	7.6	5.8	6.3	6.1	−1.2	10.0
Lumber and furniture	United States	1.2	2.0	1.6	1.2	1.8	2.5	13.6
	Japan	1.5	0.4	0.2	0.1	0.2	−9.7	1.9
	European Community (12)	0.8	1.4	1.1	1.7	1.8	4.8	15.9
	Asian NICs (4)	12.4	6.5	3.7	2.4	2.4	−8.7	10.3
	Rest of the world	1.3	1.8	2.4	2.1	1.9	1.9	14.3
	Total	1.3	2.0	1.6	1.3	1.7	1.6	13.2
Plastic and rubber products	United States	1.9	2.0	2.0	1.9	2.4	1.1	12.1
	Japan	2.0	2.6	2.2	1.9	2.4	1.1	14.0

	European Community (12)	2.0	2.6	2.5	2.0	2.0	0.2	10.8
	Asian NICs (4)	1.3	1.6	2.1	2.8	3.3	5.1	26.9
	Rest of the world	0.5	0.5	0.8	0.9	1.1	4.1	16.7
	Total	1.8	2.0	2.0	1.9	2.3	1.2	12.7
Miscellaneous manufactures	United States	5.7	5.4	6.2	5.2	5.8	0.1	11.0
	Japan	10.3	10.5	10.8	8.9	9.2	-0.7	12.0
	European Community (12)	9.2	9.9	7.5	7.8	7.4	-1.2	9.3
	Asian NICs (4)	15.8	13.5	18.3	16.6	15.7	-0.1	20.7
	Rest of the world	5.0	5.0	4.7	5.4	8.2	2.8	15.3
	Total	6.5	6.3	6.9	6.5	7.1	0.4	11.8
				(Millions of US$)				(Per cent)
Total manufacturing	United States	9,760	22,657	39,335	43,355	62,273	...	10.8
	Japan	827	1,533	3,396	5,488	7,196	...	12.8
	European Community (12)	1,840	3,132	4,983	8,055	11,288	...	10.6
	Asian NICs (4)	192	929	1,735	3,425	5,730	...	20.8
	Rest of the world	929	2,004	3,105	4,834	7,292	...	12.1
	Total	13,548	30,255	52,554	65,157	93,773	...	11.3

[1] Compounded annual average growth rates.

SOURCE Estimates by the authors, based on data from Statistics Canada.

Table 8b

Share in Canada's total imports and growth in imports, by major sector, for country/region exporters, 1971-89

	Exporter	Share					Share growth,[1] 1971-89	Import growth,[1] 1971-89
		1971	1976	1981	1986	1989		
					(Per cent)			
Total manufacturing	United States	86.4	88.2	84.8	84.0	70.2	−1.1	10.8
	Japan	97.5	97.2	97.7	98.1	98.9	0.1	12.8
	European Community (12)	95.6	93.8	89.6	88.4	86.2	−0.6	10.6
	Asian NICs (4)	88.6	91.6	93.4	96.4	96.9	0.5	20.8
	Rest of the world	56.8	36.7	43.2	68.7	68.3	1.0	12.1
	Total	85.1	81.6	81.5	84.8	74.6	−0.7	11.3
Total non-manufacturing	United States	13.6	11.8	15.2	16.0	29.8	4.4	17.1
	Japan	2.5	2.8	2.3	1.9	1.1	−4.2	7.9
	European Community (12)	4.4	6.2	10.4	11.6	13.8	6.6	18.6
	Asian NICs (4)	11.4	8.4	6.6	3.6	3.1	−6.9	11.8
	Rest of the world	43.2	63.3	56.8	31.3	31.7	−1.7	9.1
	Total	14.9	18.4	18.5	15.3	25.4	3.0	15.5
				(Millions of US$)				(Per cent)
All industries	United States	11,300	25,700	46,403	51,586	88,742	...	12.1
	Japan	849	1,578	3,478	5,595	7,279	...	12.7
	European Community (12)	1,924	3,339	5,561	9,113	13,086	...	11.2
	Asian NICs (4)	217	1,014	1,857	3,553	5,916	...	20.2
	Rest of the world	1,636	5,456	7,189	7,038	10,673	...	11.0
	Total	15,925	37,086	64,488	76,885	125,696	...	12.2

[1] Compounded annual average growth rates.

Source Estimates by the authors, based on data from Statistics Canada.

Table 9

Export penetration (log) by Canada: pooled industry and time-series regressions[1]

	United States	European Community[2]	Japan	Asian NICs[3]
Constant term	3.2519 (1.8)	2.7985 (3.2)	0.6988 (4.5)	1.2654 (3.2)
Tariff barriers	–0.1259 (10.5)	–0.0895 (4.3)	. .	. .
Nontariff barriers	–0.0282 (7.1)	. .	. .	–0.0304 (1.4)
Relative unit labour cost ratio (Canada vis-à-vis importer)	–0.6055 (1.8)	–0.9698 (5.2)	–0.0741 (2.8)	. .
Relative unit labour cost ratio (Canada vis-à-vis third country competitors)	–0.1200 (1.0)	. .	–0.0720 (1.9)	. .
Relative R&D/output ratio	0.8804 (7.3)	. .	. .	. .
Time trend	0.0407 (7.7)	–0.0156 (1.7)	0.0040 (2.1)	0.0293 (2.5)
Real exchange rate variability	–0.0333 (0.1)	–0.7089 (1.8)	–0.0997 (1.4)	. .
Comparative advantage	. .	–0.0903 (2.5)	. .	. .
Resource dummy	. .	1.2150 (9.3)	0.1921 (8.1)	. .
Machinery and equipment dummy	. .	1.1060 (9.1)	. .	–0.8033 (3.0)
Other industry dummies:				
Paper and allied products	1.0648 (7.9)	0.9403 (4.8)	0.3925 (11.6)	6.1291 (22.9)
Petroleum and coal products	–0.8786 (2.5)	. .	. .	–1.1906 (3.5)
Primary metal products	–0.6265 (3.5)	–2.2680 (12.3)	–0.2478 (6.8)	0.8424 (2.7)
Fabricated metal products	–0.7668 (6.6)	. .	. .	. .

Table 9 (concl'd.)

	United States	European Community[2]	Japan	Asian NICs[3]
Nonelectrical machinery	0.4311 (1.9)	. .	. .	. .
Electrical machinery	. .	. .	. .	. .
Transportation equipment	1.9680 (13.6)	. .	. .	. .
Textiles, clothing, and leather products	. .	. .	. .	–0.9695 (3.7)
Lumber and furniture	0.8841 (7.6)	1.0559 (5.7)	0.7260 (20.3)	. .
Miscellaneous manufactures	0.3992 (3.6)	1.9515 (11.5)	. .	–0.8596 (3.5)
$\bar{R}^2$	0.9010	0.8357	0.8813	0.8658

1 Export penetration is defined as the share of Canadian exports (value terms) in the total final domestic demand of the country/countries concerned.

2 German data were used as proxies for the European Community in the construction of the independent variables.

3 The dependent variable is the share of Canadian exports in Asian NICs' imports. This equation was estimated in level terms.

Table 10

Canada's export penetration (value terms) in the U.S. market

		Long-term cost elasticity		
	Coefficient of U.S. capacity utilization	Canada vis-à-vis the United States	Canada vis-à-vis competitors in the United States	Trend growth per year
				(Per cent)
Food, beverages, and tobacco	1.7382**	−2.4320*	. .	6.3*
Paper and publishing	. .	. .	−0.3180*	. .
Chemicals and chemical products	. .	. .	−0.7081*	3.9*
Petroleum and coal products	. .	. .	. .	7.9*
Nonmetallic mineral products	. .	. .	. .	6.9*
Primary metal products	. .	. .	0.5562*	4.3*
Fabricated metal products	. .	. .	−0.0791	5.8*
Nonelectrical machinery	−0.5648*	0.5771	. .	−0.9
Electrical machinery	. .	. .	−0.4500	6.0*
Transportation equipment	. .	−2.3263*	0.3643*	. .
Textiles, clothing, and leather products	. .	−3.6453*	0.2447**	6.4*
Lumber and furniture	. .	−0.4189**	. .	2.8*
Rubber and plastic products	. .	. .	−0.3941*	9.0*
Miscellaneous manufactures	. .	−0.6591*	. .	3.4*
Total manufacturing[1]	. . .	−0.97	0.08	1.9

*Significant at a 99-per-cent confidence level.

**Significant at a 90-per-cent confidence level.

1 Trade weighted average.

Table 11

Canada's export penetration (value terms) in the Japanese market

		Long-term cost elasticity		
	Coefficient of Japanese capacity utilization	Canada vis-à-vis Japan	Canada vis-à-vis competitors in Japan	Trend growth per year
				(Per cent)
Food, beverages, and tobacco	1.4263**	–1.7000*	. .	–6.4**
Paper and publishing	–0.6725**	–0.6970*	. .	. .
Chemicals and chemical products	2.7795*	. .	–2.5903**	4.0**
Petroleum and coal products	–3.0867**	. .	–16.4360*	. .
Nonmetallic mineral products	. .	–0.7548**	. .	–7.6*
Primary metal products	. .	. .	. .	2.9**
Fabricated metal products	. .	–1.4282*	. .	–4.1*
Nonelectrical machinery	–5.7517*	. .	–3.9561*	8.8*
Electrical machinery	–2.5392*	–0.4435*	. .	. .
Transportation equipment	5.8390*	–2.4153*	. .	. .
Textiles, clothing, and leather products	. .	. .	–5.4161*	–2.5
Lumber and furniture	2.8636*	–1.4656*	. .	. .
Rubber and plastic products	7.1592**	. .	–2.3906**	–4.2**
Miscellaneous manufactures	4.0885**	0.7720**	–3.3477**	. .
Total manufacturing[1]	. . .	–0.87	–0.52	–0.4

*Significant at a 99-per-cent confidence level.

**Significant at a 90-per-cent confidence level.

[1] Trade weighted average.

Table 12

Canada's export penetration (value terms) in the EC market[1]

		Long-term cost elasticity		
	Coefficient of capacity utilization of EC countries	Canada vis-à-vis European Community	Canada vis-à-vis competitors in European Community	Trend growth per year
				(Per cent)
Food, beverages, and tobacco	. .	–1.1998*	–2.6786*	. .
Paper and publishing	. .	–0.8496*	. .	–1.4*
Chemicals and chemical products	. .	–1.1244*	–7.7420*	. .
Petroleum and coal products	. .	–3.9636*	–6.6617*	. .
Nonmetallic mineral products	0.5982*	–0.7919*	. .	. .
Primary metal products	. .	–0.3928	1.2173	–4.9*
Fabricated metal products	. .	–1.2570*	. .	–1.5**
Nonelectrical machinery	. .	0.3581**	. .	2.3*
Electrical machinery	. .	–0.5342*	. .	. .
Transportation equipment	. .	. .	. .	–3.6*
Textiles, clothing, and leather products	. .	–1.1613*	–3.8949*	–7.0*
Lumber and furniture	. .	–2.0892*	. .	–2.3
Rubber and plastic products	. .	–0.7411*	. .	–12.2*
Miscellaneous manufactures	–3.3457*	. .	. .	–1.6
Total manufacturing[2]	. . .	–0.84	–0.92	–1.9

*Significant at a 99-per-cent confidence level.

**Significant at a 90-per-cent confidence level.

1 Data for Germany were used as proxies for costs and capacity utilization.

2 Trade weighted average.

Table 13

Canada's export penetration (value terms) in the Asian NICs market[1]

	Coefficient of Canadian capacity utilization	Long-term cost elasticity[2] vis-à-vis the countries concerned	Trend growth per year
			(Per cent)
Food, beverages, and tobacco	2.2507	..	8.4*
Paper and publishing	..	..	–2.0*
Chemicals and chemical products	..	–1.8621*	..
Petroleum and coal products	15.5842*	–28.2045*	..
Nonmetallic mineral products	–1.2660*	..	4.7*
Primary metal products	–1.0382*	–1.2517*	..
Fabricated metal products	–3.4593*	0.7639**	..
Nonelectrical machinery	..	–3.1037**	–11.8
Electrical machinery	–1.7475**	..	–3.9**
Transportation equipment	..	–7.0561**	–25.0**
Textiles, clothing, and leather products	1.9507	–2.3202*	..
Lumber and furniture	–0.9149	–4.0620*	..
Rubber and plastic products	2.2428*	–2.4753*	..
Miscellaneous manufactures	–3.1254**	..	4.6**
Total manufacturing[3]	...	–1.41	–1.4

*Significant at a 99-per-cent confidence level.

**Significant at a 90-per-cent confidence level..

[1] The dependent variable is the share of Canadian exports in Asian NICs imports.

[2] Relative wages were used as a proxy for relative unit labour costs.

[3] Trade weighted average.

Table 14

Import penetration (log) into Canada: pooled industry and time-series regressions[1]

	United States	European Community[2]	Japan	Asian NICs[3]
Constant term	0.5290 (2.2)	3.7707 (8.5)	1.2098 (1.2)	1.7902 (3.5)
Investment linkages (log)	0.3967 (8.7)	0.1815 (3.4)	0.6135 (8.7)	. .
Tariff barriers	. .	–0.0929 (3.9)	. .	. .
Nontariff barriers	–0.0546 (20.8)	–0.0032 (0.9)	–0.1616 (21.4)	–0.0722 (4.1)
Relative unit labour costs (importer vis-à-vis Canada)	. .	–0.6271 (6.5)	–0.3842 (2.2)	. .
Relative R&D/output ratio	0.0333 (3.5)	. .	. .	. .
Time trend	0.0263 (7.3)	0.0219 (5.0)	0.0292 (2.9)	0.1823 (7.2)
Real exchange rate variability	–0.5715 (1.9)	–1.1413 (0.7)	–0.5306 (1.2)	. .
Comparative advantage	. .	. .	–1.3935 (9.3)	–2.1596 (6.2)
Capacity utilization	. .	. .	–0.2775 (0.8)	. .
Resource dummy	0.4781 (8.3)	–0.7059 (10.4)	. .	. .
Machinery and equipment dummy	1.9128 (27.7)	. .	4.4695 (27.0)	–1.1992 (5.6)
Other industry dummies:				
Petroleum and coal products	–2.0160 (19.9)	–3.2233 (11.7)	–6.8692 (33.8)	–5.5269 (11.4)
Primary metal products	0.3257 (3.7)	. .	1.4728 (6.5)	. .
Textiles, clothing, and leather products	2.1292 (17.6)	2.2442 (5.5)	6.4593 (21.0)	3.5546 (4.7)

Table 14 (concl'd.)

	United States	European Community[2]	Japan	Asian NICs[3]
Lumber and furniture	–0.2950 (3.8)	. .	. .	. .
Miscellaneous manufactures	1.0930 (13.6)	1.0590 (11.3)	2.2378 (11.1)	. .
Nonelectrical machinery	. .	. .	–2.9598 (12.2)	. .
Chemicals and chemical products	. .	1.4087 (13.6)	. .	–1.4285 (3.0)
Nonmetallic mineral products	. .	1.1872 (9.0)	. .	. .
Fabricated metal products	. .	1.6694 (11.8)	. .	. .
Rubber and plastic products	. .	–0.4042 (3.4)	. .	. .
Electrical machinery	. .	. .	. .	3.0752 (5.4)
$\bar{R}^2$	0.9633	0.9408	0.9539	0.6836

1 Import penetration is defined as the share of Canadian imports (value terms) from the country/countries concerned in the total final domestic demand of Canada.

2 German data were used as proxies for the European Community in the construction of the independent variables.

3 The dependent variable is the share of Canadian exports in Asian NICs' imports.

Table 15

U.S. import penetration (value terms) in the Canadian market

		Long-term cost elasticity		
	Coefficient of Canadian capacity utilization	United States vis-à-vis Canada	United States vis-à-vis competitors in Canada	Trend growth per year
				(Per cent)
Food, beverages, and tobacco	2.2651*	–0.77*	–0.77*	. .
Paper and publishing	–0.5239*	–1.02*	–0.27*	. .
Chemicals and chemical products	0.1996**	–0.48**	–0.42*	. .
Petroleum and coal products	1.1093*	–1.74*	2.10*	. .
Nonmetallic mineral products	. .	–2.90*	–0.50*	. .
Primary metal products	. .	. .	–0.49*	. .
Fabricated metal products	. .	. .	–0.68*	. .
Nonelectrical machinery	–0.1957**	0.24	. .	. .
Electrical machinery	. .	0.38*	. .	7.5*
Transportation equipment	. .	–0.06**	. .	2.5*
Textiles, clothing, and leather products	. .	–1.33**	–0.61*	–3.7*
Lumber and furniture	. .	1.33*	. .	. .
Rubber and plastic products	–0.2363**	–1.01*	. .	1.7*
Miscellaneous manufactures	–0.2893**	. .	–0.36*	–0.7**
Total manufacturing[1]	. . .	–0.12	–0.12	1.5

*Significant at a 99-per-cent confidence level.

**Significant at a 90-per-cent confidence level.

[1] Trade weighted average.

Table 16

Japan's import penetration (value terms) in the Canadian market

	Coefficient of Canadian capacity utilization	Long-term cost elasticity: Japan vis-à-vis Canada	Long-term cost elasticity: Japan vis-à-vis competitors in Canada	Trend growth per year
				(Per cent)
Food, beverages, and tobacco	–0.8393	. .	–6.34*	29.8*
Paper and publishing	–0.0051	. .	–1.46*	4.4*
Chemicals and chemical products	–0.0088	–0.66*	. .	3.1*
Petroleum and coal products	. .	. .	. .	. .
Nonmetallic mineral products	. .	. .	–0.83*	6.1*
Primary metal products	. .	. .	0.46	–3.6*
Fabricated metal products	. .	. .	. .	. .
Nonelectrical machinery	. .	–1.12*	. .	8.7*
Electrical machinery	. .	–0.77*	. .	. .
Transportation equipment	–1.0588*	–1.61*	. .	12.0*
Textiles, clothing, and leather products	–0.4031**	. .	–1.70*	. .
Lumber and furniture	–0.5619**	. .	–1.45*	. .
Rubber and plastic products	0.5748*	. .	–0.02	3.4*
Miscellaneous manufactures	–0.3816	. .	–0.40*	4.0*
Total manufacturing[1]	. . .	–0.82	–0.14	5.3

*Significant at a 99-per-cent confidence level.
**Significant at a 90-per-cent confidence level.
[1] Trade weighted average.

Table 17

Import penetration by the EC countries (value terms) in the Canadian market[1]

		Long-term cost elasticity		
	Coefficient of Canadian capacity utilization	European Community vis-à-vis Canada	European Community vis-à-vis competitors in Canada	Trend growth per year
				(Per cent)
Food, beverages, and tobacco	. .	–0.18*	. .	1.6*
Paper and publishing	0.625*	–0.40*	. .	. .
Chemicals and chemical products	. .	–0.40**	. .	2.5*
Petroleum and coal products	. .	–3.10*	. .	5.1**
Nonmetallic mineral products	. .	–0.13**	. .	2.2*
Primary metal products	. .	–0.58*	. .	. .
Fabricated metal products	. .	–1.10*	. .	1.9*
Nonelectrical machinery	. .	–0.55*	. .	. .
Electrical machinery	. .	–0.79*	. .	3.8*
Transportation equipment	–0.5847*	–0.95*	. .	2.6*
Textiles, clothing, and leather products	0.1782**	–1.20*	. .	3.6*
Lumber and furniture	. .	–2.47*	. .	10.0*
Rubber and plastic products	0.6905*	–0.30**	. .	. .
Miscellaneous manufactures	–0.63*	. .	. .	. .
Total manufacturing[2]	. . .	–0.69	. .	1.7

*Significant at a 99-per-cent confidence level.

**Significant at a 90-per-cent confidence level.

[1] Data for Germany were used as proxies for EC costs.

[2] Trade weighted average.

Table 18

Import penetration by the Asian NICs (value terms) in the Canadian market

	Coefficient of Canadian capacity utilization	Long-term cost elasticity[1]		
		Asian NICs vis-à-vis Canada	Asian NICs vis-à-vis Japan	Trend growth per year
				(Per cent)
Food, beverages, and tobacco	..	..	..	..
Paper and publishing	..	−2.2145*	..	15.2*
Chemicals and chemical products	0.7465*	..	..	12.8*
Petroleum and coal products	−2.0719*	..	..	8.6*
Nonmetallic mineral products	−0.4960**	..	..	8.8*
Primary metal products	2.2628*	..	..	17.3*
Fabricated metal products	..	−0.9041**	..	17.6*
Nonelectrical machinery	−0.3308	..	..	22.2*
Electrical machinery	..	..	−2.2135**	12.4*
Transportation equipment	2.2420*	..	−4.5835**	45.0*
Textiles, clothing, and leather products	−0.7372*	..	−0.7877**	8.4*
Lumber and furniture	1.1097*	..	..	−5.4*
Rubber and plastic products	..	..	−0.8473**	14.6*
Miscellaneous manufactures	..	..	−1.0124*	12.0*
Total manufacturing[2]	...	−0.04	−1.11	11.5

*Significant at a 99-per-cent confidence level.

**Significant at a 90-per-cent confidence level.

[1] Relative wages were used as a proxy for relative unit labour costs.

[2] Trade weighted average.

Table 19

Sources of growth in Canadian exports (value) of manufactured products to the United States, by industry, 1971-86

	Average annual growth in exports	Sources of growth in exports		
		Average annual growth in U.S. apparent consumption	Trend growth per year	Average annual effect of changes in cost competitiveness
		(Per cent)		
Food, beverages, and tobacco	9.6	7.4	6.3	–4.1
Paper and publishing	10.4	10.2	–	0.2
Chemicals and chemical products	14.1	9.6	3.9	0.6
Petroleum and coal products	19.7	10.6	7.9	1.2
Nonmetallic mineral products	15.7	8.3	6.9	0.5
Primary metal products	9.8	5.1	4.3	0.4
Fabricated metal products	14.9	7.7	5.8	1.4
Nonelectrical machinery	10.0	9.7	–0.9	–8.2
Electrical machinery	15.1	11.1	8.0	–4.0
Transportation equipment	13.3	9.7	–	3.6
Textiles, clothing, and leather products	10.9	6.7	6.4	–2.2
Lumber and furniture	11.5	9.0	2.8	–0.3
Rubber and plastic products	20.2	8.7	9.0	2.5
Miscellaneous manufactures	13.7	10.0	3.4	0.3
Total manufacturing[1]	12.4	9.2	1.9	1.3

[1] Trade weighted average.

Source Estimates by the authors.

Table 20

Sources of growth in Canadian exports (value) of manufactured products to Japan, by industry, 1971-86

	Average annual growth in exports	Sources of growth in exports		
		Average annual growth in apparent consumption in Japan	Trend growth per year	Average annual effect of changes in cost competitiveness
	(Per cent)			
Food, beverages, and tobacco	10.9	14.5	–6.4	2.8
Paper and publishing	14.6	14.5	–	0.1
Chemicals and chemical products	15.4	13.7	4.0	–2.3
Petroleum and coal products	48.6	15.6	–	33.0
Nonmetallic mineral products	10.2	13.6	–7.6	4.2
Primary metal products	7.7	11.1	2.9	–6.3
Fabricated metal products	15.6	13.6	–4.1	6.1
Nonelectrical machinery	3.9	12.1	8.8	–17.0
Electrical machinery	14.8	16.4	–	–1.6
Transportation equipment	30.5	15.1	–	15.4
Textiles, clothing, and leather products	16.2	11.0	–2.5	7.7
Lumber and furniture	15.7	9.6	–	6.1
Rubber and plastic products	9.7	16.8	–4.2	–2.9
Miscellaneous manufactures	9.9	14.4	–	–4.5
Total manufacturing[1]	13.4	12.9	–0.4	0.9

[1] Trade weighted average.

Source: Estimates by the authors.

Table 21

Sources of growth in Canadian exports (value) of manufactured products to the European Community, by industry, 1971-86

		Sources of growth in exports		
	Average annual growth in exports	Average annual growth in apparent consumption in the EC countries	Trend growth per year	Average annual effect of changes in cost competitiveness
		(Per cent)		
Food, beverages, and tobacco	2.4	9.4	–	–7.0
Paper and publishing	8.2	10.2	–1.4	–0.6
Chemicals and chemical products	12.7	10.7	–	2.0
Petroleum and coal products	20.2	12.3	–	7.9
Nonmetallic mineral products	8.7	8.7	–	–
Primary metal products	–1.8	6.1	–4.9	–3.0
Fabricated metal products	8.1	8.6	–1.5	1.0
Nonelectrical machinery	11.2	8.7	2.3	0.2
Electrical machinery	11.7	11.1	–	0.6
Transportation equipment	10.4	10.7	–3.6	3.3
Textiles, clothing, and leather products	3.8	7.6	–7.0	3.2
Lumber and furniture	8.8	8.5	–2.3	2.6
Rubber and plastic products	–0.4	11.0	–12.2	0.8
Miscellaneous manufactures	9.9	9.5	–1.6	2.0
Total manufacturing[1]	7.2	9.2	–1.9	–0.2

[1] Trade weighted average.

Source Estimates by the authors.

Table 22

Sources of growth in Canadian exports (value) of manufactured products to the Asian NICs, by industry, 1971-86

	Average annual growth in exports	Sources of growth in exports		
		Average annual growth in apparent consumption in the Asian NICs	Trend growth per year	Average annual effect of changes in cost competitiveness
		(Per cent)		
Food, beverages, and tobacco	24.1	13.4	8.4	2.3
Paper and publishing	15.5	17.1	–2.0	0.4
Chemicals and chemical products	24.7	19.5	–	5.2
Petroleum and coal products	–	14.8	–	–14.8
Nonmetallic mineral products	19.3	14.7	4.7	–0.1
Primary metal products	23.8	17.1	–	6.7
Fabricated metal products	14.9	16.2	–	–1.3
Nonelectrical machinery	13.6	15.7	–11.8	9.7
Electrical machinery	25.7	24.5	–3.9	5.1
Transportation equipment	12.2	16.1	–25.0	21.1
Textiles, clothing, and leather products	21.7	15.3	–	6.4
Lumber and furniture	37.4	23.2	–	14.2
Rubber and plastic products	41.6	21.7	–	19.9
Miscellaneous manufactures	31.8	19.0	4.6	8.2
Total manufacturing[1]	21.7	17.9	–1.4	5.2

[1] Trade weighted average.

Source Estimates by the authors.

Table 23

Sources of growth in Canadian imports (value) of manufactured products from the United States, by industry, 1971-86

	Average annual growth in imports	Sources of growth in imports		
		Average annual growth in Canada's apparent consumption	Trend growth per year	Average annual effect of changes in cost competitiveness
		(Per cent)		
Food, beverages, and tobacco	11.7	7.9	–	3.8
Paper and publishing	9.6	9.1	–	0.5
Chemicals and chemical products	10.3	10.2	–	0.1
Petroleum and coal products	14.2	10.8	–	3.4
Nonmetallic mineral products	9.9	8.0	–	1.9
Primary metal products	5.3	6.9	–	–1.6
Fabricated metal products	7.9	7.5	–	0.4
Nonelectrical machinery	8.9	9.2	–	–0.3
Electrical machinery	13.7	9.6	7.5	–3.4
Transportation equipment	11.3	9.1	2.5	–0.3
Textiles, clothing, and leather products	5.9	7.1	–3.7	2.5
Lumber and furniture	10.8	8.5	–	2.3
Rubber and plastic products	10.2	8.7	1.7	–0.2
Miscellaneous manufactures	9.8	8.8	–0.7	1.7
Total manufacturing[1]	10.3	9.0	1.5	–0.2

[1] Trade weighted average.

Source Estimates by the authors.

Table 24

Sources of growth in Canadian imports (value) of manufactured products from Japan, by industry, 1971-86

		Sources of growth in imports		
	Average annual growth in imports	Average annual growth in Canada's apparent consumption	Trend growth per year	Average annual effect of changes in cost competitiveness
		(Per cent)		
Food, beverages, and tobacco	7.2	7.9	29.8	–30.5
Paper and publishing	12.9	9.1	4.4	–0.6
Chemicals and chemical products	15.7	10.2	3.1	2.4
Petroleum and coal products	40.4	10.8	–	29.6
Nonmetallic mineral products	10.3	8.0	6.1	–3.8
Primary metal products	1.0	6.9	–3.6	–2.3
Fabricated metal products	6.1	7.5	–	–1.4
Nonelectrical machinery	20.6	9.2	8.7	2.7
Electrical machinery	16.5	9.6	–	6.9
Transportation equipment	16.6	9.1	12.0	–4.5
Textiles, clothing, and leather products	0.8	7.1	–	–6.3
Lumber and furniture	–4.7	8.5	–	–13.2
Rubber and plastic products	13.0	8.7	3.4	0.9
Miscellaneous manufactures	12.4	8.8	4.0	–0.4
Total manufacturing[1]	13.6	8.8	5.3	–0.5

[1] Trade weighted average.

Source Estimates by the authors.

Table 25

Sources of growth in Canadian imports (value) of manufactured products from the European Community, by industry, 1971-86

	Average annual growth in imports	Sources of growth in imports		
		Average annual growth in Canada's apparent consumption	Trend growth per year	Average annual effect of changes in cost competitiveness
		(Per cent)		
Food, beverages, and tobacco	10.0	7.9	1.6	0.5
Paper and publishing	10.1	9.1	–	1.0
Chemicals and chemical products	13.2	10.2	2.5	0.5
Petroleum and coal products	16.9	10.8	5.1	–
Nonmetallic mineral products	10.4	8.0	2.2	0.2
Primary metal products	9.8	6.9	–	2.9
Fabricated metal products	9.6	7.5	1.9	0.2
Nonelectrical machinery	10.9	9.2	–	1.7
Electrical machinery	9.9	9.6	3.8	–3.5
Transportation equipment	10.8	9.1	2.6	–0.9
Textiles, clothing, and leather products	8.1	7.1	3.6	–2.6
Lumber and furniture	16.1	8.5	10.0	–2.4
Rubber and plastic products	10.3	8.7	–	1.6
Miscellaneous manufactures	9.1	8.8	–	0.3
Total manufacturing[1]	10.4	8.6	1.7	0.1

[1] Trade weighted average.

Source Estimates by the authors.

Table 26

Sources of growth in Canadian imports (value) of manufactured products from the Asian NICs, by industry, 1971-86

		Sources of growth in imports		
	Average annual growth in imports	Average annual growth in Canada's apparent consumption	Trend growth per year	Average annual effect of changes in cost competitiveness
		(Per cent)		
Food, beverages, and tobacco	15.3	7.9	–	7.4
Paper and publishing	19.3	9.1	15.2	–5.0
Chemicals and chemical products	27.4	10.2	12.8	4.4
Petroleum and coal products	–	10.8	8.6	–19.4
Nonmetallic mineral products	20.6	8.0	8.8	3.8
Primary metal products	37.6	6.9	17.3	13.4
Fabricated metal products	26.7	7.5	17.6	1.6
Nonelectrical machinery	36.4	9.2	22.2	5.0
Electrical machinery	28.3	9.6	12.4	6.3
Transportation equipment	53.1	9.1	45.0	–1.0
Textiles, clothing, and leather products	17.0	7.1	8.4	1.5
Lumber and furniture	8.5	8.5	–5.4	5.4
Rubber and plastic products	27.5	8.7	14.6	4.2
Miscellaneous manufactures	21.5	8.8	12.0	0.7
Total manufacturing[1]	22.2	8.1	11.5	2.6

[1] Trade weighted average.

SOURCE Estimates by the authors.

Table 27

Determinants of the growth in Canada's exports to the United States, by industry, 1980-85

	Cost competitiveness					Growth in exports to the United States		
	Cost effect vis-à-vis the United States	Cost effect vis-à-vis others	Total	Trend growth	Growth in U.S. apparent con-sumption	Estimated	Actual	Actual growth in Canada's total exports
	(Average annual percentage growth)							
Food, beverages, and tobacco	–0.2	. .	–0.2	6.3	3.8	9.9	9.2	2.9
Paper and publishing	. .	–4.3	–4.3	. .	8.1	3.8	4.8	1.1
Chemicals and chemical products	. .	–5.7	–5.7	3.9	5.1	3.3	6.3	3.0
Petroleum and coal products	. .	. .	–	7.9	–1.4	6.5	13.2	3.7
Nonmetallic mineral products	. .	. .	–	6.9	4.3	11.2	13.0	8.7
Primary metal products	. .	2.7	2.7	4.3	–2.4	4.6	2.5	–1.8
Fabricated metal products	. .	–0.4	–0.4	5.8	4.4	9.7	10.3	4.7
Nonelectrical machinery	5.6	–	5.6	–0.9	5.4	10.1	8.9	6.4
Electrical machinery	. .	–3.8	–3.8	8.0	10.2	14.4	17.5	13.8
Transportation equipment	6.4	0.9	7.3	. .	11.9	19.2	21.4	18.6
Textiles, clothing, and leather products	6.9	0.8	7.7	6.4	6.5	20.6	18.6	3.0
Lumber and furniture	2.2	. .	2.2	2.8	4.4	9.4	11.2	5.3
Rubber and plastic products	. .	–2.6	–2.6	9.0	7.5	13.8	17.7	14.8
Miscellaneous manufactures	1.0	–	1.0	3.4	8.2	12.6	10.7	5.1
Total manufacturing[1]	3.1	–0.6	2.5	2.0	7.4	11.9	13.1	8.3

[1] Trade weighted average.

SOURCE Estimates by the authors.

Table 28

Determinants of the growth in Canada's exports to Japan, by industry, 1980-85

	Cost competitiveness				Growth in Japan's apparent con-sumption	Growth in exports to Japan		Actual growth in Canada's total exports
	Cost effect vis-à-vis Japan	Cost effect vis-à-vis others	Total	Trend growth		Estimated	Actual	
	(Average annual percentage growth)							
Food, beverages, and tobacco	3.9	. .	3.9	–6.4	2.2	–0.3	–2.9	2.9
Paper and publishing	–6.5	. .	–6.5	. .	2.6	–3.9	–4.4	1.1
Chemicals and chemical products	. .	–7.1	–7.1	4.0	1.5	–1.6	10.1	3.0
Petroleum and coal products	. .	32.9	32.9	. .	–4.3	28.6	–26.4	3.7
Nonmetallic mineral products	–3.6	. .	–3.6	–7.6	–0.2	–11.4	–18.8	8.7
Primary metal products	. .	. .	–	2.9	–2.5	0.4	–2.4	–1.8
Fabricated metal products	–5.8	. .	–5.8	–4.1	4.2	–5.8	–12.4	4.7
Nonelectrical machinery	. .	–42.6	–42.6	8.8	3.6	–30.2	–2.8	6.4
Electrical machinery	–4.2	. .	–4.2	. .	10.7	6.5	2.8	13.8
Transportation equipment	4.3	. .	4.3	. .	6.0	10.4	–22.1	18.6
Textiles, clothing, and leather products	. .	–20.1	–20.1	–2.5	1.0	–21.6	–8.8	3.0
Lumber and furniture	–3.6	. .	–3.6	. .	–4.7	–8.3	–7.3	5.3
Rubber and plastic products	. .	–9.1	–9.1	–4.2	5.6	–7.6	3.0	14.8
Miscellaneous manufactures	1.9	–5.8	–3.9	. .	1.9	–2.0	2.8	5.1
Total manufacturing[1]	–1.7	–2.0	–3.6	–0.1	0.3	–3.4	–3.2	8.3

[1] Trade weighted average.

Source Estimates by the authors.

Table 29

Determinants of the growth in Canada's exports to the European Community, by industry, 1980-85

	Cost competitiveness					Growth in exports to the EC countries		
	Cost effect vis-à-vis the European Community	Cost effect vis-à-vis others	Total	Trend growth	Growth in apparent consumption in the EC countries	Estimated	Actual	Actual growth in Canada's total exports
				(Average annual percentage growth)				
Food, beverages, and tobacco	−12.8	−0.1	−12.9	. .	−4.8	−17.7	−12.4	2.9
Paper and publishing	−12.0	. .	−12.0	−1.4	−3.8	−17.2	−10.9	1.1
Chemicals and chemical products	−9.2	4.6	−4.6	. .	−2.8	−7.4	−6.4	3.0
Petroleum and coal products	−37.0	15.7	−21.3	. .	−5.9	−27.2	−30.4	3.7
Nonmetallic mineral products	−7.9	. .	−7.9	. .	−8.3	−16.2	−15.1	8.7
Primary metal products	−3.0	−4.0	−7.1	−4.9	−8.5	−20.5	−17.7	−1.8
Fabricated metal products	−9.6	. .	−9.6	−1.5	−7.6	−18.6	−16.6	4.7
Nonelectrical machinery	4.7	. .	4.7	2.3	−7.5	−0.6	−0.1	6.4
Electrical machinery	−3.1	. .	−3.1	. .	−2.1	−5.2	1.2	13.6
Transportation equipment	. .	. .	–	−3.6	−5.0	−8.6	−5.2	18.6
Textiles, clothing, and leather products	−10.7	2.6	−8.1	−7.0	−6.1	−21.1	−19.4	3.0
Lumber and furniture	−8.8	. .	−8.8	−2.3	−9.7	−20.8	−15.2	5.3
Rubber and plastic products	−7.2	. .	−7.2	−12.2	−4.4	−23.8	−18.8	14.8
Miscellaneous manufactures	. .	. .	–	−1.6	−9.0	−10.6	−5.5	5.1
Total manufacturing[1]	−7.8	0.4	−7.4	−1.6	−5.5	−14.5	−10.9	8.3

[1] Trade weighted average.

Source Estimates by the authors.

Table 30

Determinants of the growth in Canada's exports to the Asian NICs, by industry, 1980-85

	Cost competitiveness[1]					Growth in exports to the Asian NICs		
	Cost effect vis-à-vis the Asian NICs	Cost effect vis-à-vis others	Total	Trend growth	Growth in apparent consumption of the Asian NICs	Estimated	Actual	Actual growth in Canada's total exports
				(Average annual percentage growth)				
Food, beverages, and tobacco	. .	. .	–	8.4	3.5	18.1	2.2	2.9
Paper and publishing	. .	. .	–	–2.0	5.1	3.1	–0.9	1.1
Chemicals and chemical products	0.6	. .	0.6	. .	3.5	6.8	1.2	3.0
Petroleum and coal products	40.9	. .	40.9	. .	2.9	43.8	–39.6	3.7
Nonmetallic mineral products	. .	. .	–	4.7	–2.8	14.4	–10.2	8.7
Primary metal products	6.5	. .	6.5	. .	–1.7	3.2	–1.3	–1.8
Fabricated metal products	–8.4	. .	–8.4	. .	3.5	–5.0	–15.1	4.7
Nonelectrical machinery	2.2	. .	2.2	–11.8	2.6	–7.0	–16.0	6.4
Electrical machinery	. .	. .	–	–3.9	10.5	6.6	22.1	13.8
Transportation equipment	32.2	. .	32.2	–25.0	5.4	–8.6	20.5	18.6
Textiles, clothing, and leather products	8.7	. .	8.7	. .	6.8	7.2	8.3	3.0
Lumber and furniture	6.2	. .	6.2	. .	6.5	22.6	16.2	5.3
Rubber and plastic products	5.0	. .	5.0	. .	7.4	12.4	33.6	14.8
Miscellaneous manufactures	. .	. .	–	4.6	6.7	10.8	–1.2	5.1
Total manufacturing[2]	3.4	. .	3.4	–1.1	3.8	6.0	0.1	8.3

1 Based on relative wages rather than unit labour costs.

2 Trade weighted average.

Source Estimates by the authors.

Table 31

Determinants of the growth in Canada's imports from the United States, by industry, 1980-85

	Cost competitiveness				Growth in Canada's apparent con-sumption	Growth in imports from the United States		Actual growth in Canada's total imports
	Cost effect vis-à-vis Canada	Cost effect vis-à-vis others	Total	Trend growth		Estimated	Actual	
	(Average annual percentage growth)							
Food, beverages, and tobacco	0.1	–8.1	–8.0	. .	2.6	–5.5	–0.3	–2.3
Paper and publishing	0.8	–3.5	–2.8	. .	5.7	2.9	5.1	6.3
Chemicals and chemical products	–0.7	–4.1	–4.8	. .	6.1	1.3	2.5	4.3
Petroleum and coal products	–4.2	24.9	20.7	. .	2.9	23.6	18.5	13.8
Nonmetallic mineral products	1.9	–4.2	–2.3	. .	3.6	1.2	7.3	6.6
Primary metal products	. .	–4.9	–4.9	. .	0.3	–4.6	–3.1	1.1
Fabricated metal products	. .	–4.6	–4.6	. .	0.2	–4.4	–2.2	–0.5
Nonelectrical machinery	–2.1	. .	–2.1	. .	–2.1	–4.2	0.1	1.6
Electrical machinery	2.5	. .	2.5	7.5	6.9	16.9	11.8	12.5
Transportation equipment	–0.2	. .	–0.2	2.5	9.5	11.8	13.8	14.0
Textiles, clothing, and leather products	–2.6	–6.0	–8.6	–3.7	2.8	–9.5	–1.8	6.6
Lumber and furniture	–7.5	. .	–7.5	. .	1.5	–6.0	0.6	3.0
Rubber and plastic products	–0.3	. .	–0.3	1.7	3.6	5.0	6.3	6.6
Miscellaneous manufactures	. .	–2.5	–2.5	–0.7	3.5	0.3	2.3	4.5
Total manufacturing[1]	–0.4	–1.1	–1.5	1.6	4.7	4.8	6.7	7.4

[1] Trade weighted average.

Source Estimates by the authors.

Table 32

Determinants of the growth in Canada's imports from Japan, by industry, 1980-85

	Cost competitiveness				Growth in Canada's apparent con-sumption	Growth in imports from Japan		Actual growth in Canada's total imports
	Cost effect vis-à-vis Canada	Cost effect vis-à-vis others	Total	Trend growth		Estimated	Actual	
				(Average annual percentage growth)				
Food, beverages, and tobacco	. .	–34.5	–34.5	29.8	2.6	–2.1	11.0	–2.3
Paper and publishing	. .	8.9	8.9	4.4	5.7	19.0	20.2	6.3
Chemicals and chemical products	4.5	4.3	8.9	3.1	6.1	18.1	14.3	4.3
Petroleum and coal products	. .	. .	–	. .	2.9	2.9	8.0	13.8
Nonmetallic mineral products	. .	1.3	1.3	6.1	3.6	11.0	12.0	6.6
Primary metal products	. .	. .	–	–3.6	0.3	–3.3	–2.1	1.1
Fabricated metal products	. .	. .	–	. .	0.2	0.2	–2.2	–0.5
Nonelectrical machinery	5.5	. .	5.5	8.7	–2.1	12.1	18.5	1.6
Electrical machinery	6.6	. .	6.6	. .	6.9	13.5	18.9	12.5
Transportation equipment	–2.9	. .	–2.9	12.0	9.5	18.6	15.1	14.0
Textiles, clothing, and leather products	. .	1.2	1.2	. .	2.8	4.0	6.6	6.6
Lumber and furniture	. .	9.3	9.3	. .	1.5	10.8	6.4	3.0
Rubber and plastic products	. .	–	–	3.4	3.6	7.0	5.6	6.6
Miscellaneous manufactures	. .	0.9	0.9	4.0	3.5	8.4	7.0	4.5
Total manufacturing[1]	0.9	0.3	1.2	6.0	5.8	12.9	13.1	7.4

1 Trade weighted average.
Source Estimates by the authors.

Table 33

Determinants of the growth in Canada's imports from the European Community, by industry, 1980-85

	Cost competitiveness				Growth in Canada's apparent con-sumption	Growth in imports from the European Community		Actual growth in Canada's total imports
	Cost effect vis-à-vis Canada	Cost effect vis-à-vis others	Total	Trend growth		Estimated	Actual	
	(Average annual percentage growth)							
Food, beverages, and tobacco	1.7	..	1.7	1.6	2.6	5.9	5.1	–2.3
Paper and publishing	5.0	..	5.0	..	5.7	10.7	7.7	6.3
Chemicals and chemical products	3.0	..	3.0	2.5	6.1	11.7	9.1	4.3
Petroleum and coal products	26.5	..	26.5	5.1	2.9	34.4	43.7	13.8
Nonmetallic mineral products	1.2	..	1.2	2.2	3.6	6.9	4.1	6.6
Primary metal products	4.2	..	4.2	..	0.3	4.5	14.9	1.1
Fabricated metal products	7.8	..	7.8	1.9	0.2	9.9	4.6	–0.5
Nonelectrical machinery	6.3	..	6.3	..	–2.1	4.2	3.2	1.6
Electrical machinery	4.3	..	4.3	3.8	6.9	15.0	9.4	12.5
Transportation equipment	6.6	..	6.6	2.6	9.5	18.7	8.1	14.0
Textiles, clothing, and leather products	10.1	..	10.1	3.6	2.8	16.5	13.0	6.6
Lumber and furniture	10.0	..	10.0	10.0	1.5	21.5	18.1	3.0
Rubber and plastic products	2.7	..	2.7	..	3.6	6.3	3.7	6.6
Miscellaneous manufactures	4.4	..	4.4	..	3.5	7.9	6.6	4.5
Total manufacturing[1]	5.5	..	5.5	1.7	3.2	10.4	8.0	7.4

[1] Trade weighted average.

Source Estimates by the authors.

Table 34

Determinants of the growth in Canada's imports from the Asian NICs, by industry, 1980-85

	Cost competitiveness[1]					Growth in imports from the Asian NICs	
	Cost effect vis-à-vis Canada	Cost effect vis-à-vis Japan	Total	Trend growth	Growth in Canada's total imports	Estimated	Actual
	(Average annual percentage growth)						
Food, beverages, and tobacco	. .	. .	–	. .	–2.3	–2.3	–0.8
Paper and publishing	–0.6	. .	–0.6	15.2	6.3	20.9	24.8
Chemicals and chemical products	. .	. .	–	12.8	4.3	17.1	22.9
Petroleum and coal products	. .	. .	–	8.6	13.8	22.4	24.6
Nonmetallic mineral products	. .	. .	–	8.8	6.6	15.4	7.9
Primary metal products	. .	. .	–	17.3	1.1	18.4	21.6
Fabricated metal products	–1.4	. .	–1.4	17.6	–0.5	15.8	13.8
Nonelectrical machinery	. .	. .	–	22.2	1.6	23.8	16.7
Electrical machinery	. .	–8.3	–8.3	12.4	12.5	16.6	14.3
Transportation equipment	. .	–20.3	–20.3	45.0	14.0	38.8	92.8
Textiles, clothing, and leather products	. .	–2.7	–2.7	8.4	6.6	12.3	12.3
Lumber and furniture	. .	. .	–	–5.4	3.0	–2.4	1.8
Rubber and plastic products	. .	–4.5	–4.5	14.6	6.6	16.6	15.1
Miscellaneous manufactures	. .	–4.9	–4.9	12.0	4.5	11.7	11.5
Total manufacturing[2]	–0.1	–4.8	–4.9	12.8	7.0	14.9	17.1

1 Based on relative wages rather than unit labour costs.
2 Trade weighted average.
Source Estimates by the authors.

Table 35

Projected effects (by 1994) of the recent changes (1985-90) in cost competitiveness on Canada's manufacturing exports and imports[1]

	Exports	Imports	Exports less imports
		(Per cent)	
United States	–25.0	10.4	–35.4
Japan	5.6	–13.2	18.9
European Community	10.4	–23.8	34.2
Asian NICs	64.7	–30.8	95.5
Total[2]	–20.1	1.6	–21.7

[1] Estimated percentage change in exports and imports relative to what would happen without the cost changes. These impacts are due to the relative cost changes only. Other factors that impact on Canada's trade are not included.

[2] Trade weighted average.

SOURCE Estimates by the authors.

Table 36

Projected effects (by 1994) of the recent changes (1985-90) in cost competitiveness on Canada's manufacturing exports and imports,[1] by industry

	United States			Total[2]		
	Exports	Imports	Difference	Exports	Imports	Difference
			(Per cent)			
Food, beverages, and tobacco	−60.4	93.4	−153.8	−43.0	58.3	−101.3
Paper and publishing	10.4	55.3	−44.9	13.1	44.2	−31.1
Chemicals and chemical products	21.1	61.1	−40.0	16.0	42.9	−26.8
Petroleum and coal products	–	−76.6	76.6	323.9	−74.3	398.2
Nonmetallic mineral products	–	212.6	−212.6	1.4	129.6	−128.2
Primary metal products	−18.0	36.4	−54.4	−10.4	18.5	−28.9
Fabricated metal products	0.5	48.3	−47.8	3.0	23.0	−20.0
Nonelectrical machinery	46.9	−13.7	60.6	44.2	−14.1	58.3
Electrical machinery	14.2	−9.1	23.4	14.3	−13.1	27.4
Transportation equipment	−51.0	1.5	−52.5	−49.7	−3.5	−46.1
Textiles, clothing, and leather products	−74.5	100.3	−174.7	−60.3	13.0	−73.3
Lumber and furniture	−16.3	62.5	−78.8	−0.2	35.9	−36.1
Rubber and plastic products	4.6	58.1	−53.6	9.4	38.5	−29.2
Miscellaneous manufactures	−28.2	21.7	−49.8	−23.4	5.1	−28.5
Total manufacturing[3]	−25.0	10.4	−35.4	−20.1	1.6	−21.7

1 Estimated percentage change in exports and imports relative to what would happen without the cost changes. These impacts are due to the relative cost changes only. Other factors that impact on Canada's trade are not included.

2 Trade with the United States, Japan, the European Community, and the Asian NICs.

3 Trade weighted average.

SOURCE Estimates by the authors.

A Canada's Trading Relationships on an Industry Basis

In this appendix we review Canada's export performance in the United States, Japan, the European Community, the Asian NICs, and the rest of the world. We also briefly examine Canada's merchandise trade balance, the extent to which domestic producers supply Canadian demand, and the shares of Canada's imports held by the various countries/regions. All of this analysis is done on an industry basis. (The reader will find the tables for this appendix on pages 90 to 120.)

Canada's Export Performance

United States

The United States supplied about 13 per cent of world exports in 1989, not too different than in 1971. Its share is significant – 5 per cent or over (Tables A-1 and A-2) in every industry. However, 80 per cent of its exports in 1989 were products of the manufacturing industries, primarily in chemicals, machinery, and equipment (Tables A-3 and A-4).

The Canadian share of U.S. total merchandise imports (value) declined from 27.4 per cent in 1971 to 18.4 per cent in 1989 (Table A-4). The importance of manufactured imports from Canada in total U.S. manufactured imports changed in a similar way. Much of this decline can be attributed to the large reductions in Canada's shares in the nonelectrical and electrical machinery and transportation equipment industries. For instance, Canada's shares in the two machinery industries declined at annual rates of roughly 4 per cent during the period 1971-89.

On the other hand, Canada's share of U.S. imports in the resource-based manufacturing industries and the farming industry either increased or declined at less than the average rate over the period 1971-89 (Table A-4). Despite some losses in market shares, Canada still dominated other countries in the U.S. market in 1989 in the following resource-based manufacturing industries: paper and publishing (70.3 per cent of U.S. imports), lumber and furniture (47.2 per cent), and primary metals (26.2 per cent).

European Community

The European Community accounted for an average of over 35 per cent of total world exports of goods in the period 1971-89. Similarly, its share in world manufactured exports is very large, averaging over 43 per cent during the period 1971-89 (Table A-1). In 1989, the European Community accounted for over half of world exports in food, chemicals, nonmetallic minerals, fabricated metals, and rubber and plastic products (Table A-2). Most of its exports (almost 90 per cent) are manufactured products, but 10 per cent are farm products (Tables A-3 and A-4).

Canada's share of this huge market is very small and declining. In 1989, Canadian exporters supplied only 0.9 per cent of total imports by the EC countries, compared with 2.1 per cent in 1971. Similarly, Canada's share of total imports of manufactured goods by the EC countries declined from 1.5 per cent in 1971 to a mere 0.8 per cent in 1989 (Table A-6). Canada's largest inroads into the EC market have been in the resource-related industries but, here as well, Canadian exporters have lost considerable ground over the past two decades.

Japan

The Japanese role in world merchandise trade, especially in manufactured goods, has steadily increased during the last 20 years, from 6.8 per cent in 1971 to 8.9 per cent in 1989 (Table A-1). But its role in world exports is quite uneven on an industry-by-industry basis. Most of the growth in its total share reflects significant expansion of its machinery and equipment exports. In almost every other industry its share of world exports fell between 1971 and 1989 (Table A-2). Manufactured goods account for about 98 per cent of its merchandise exports, a proportion that has changed little in the past two decades (Tables A-3 and A-4).

As in the EC market, Canada's share of total Japanese merchandise imports has declined – from 5.3 per cent in 1971 to 3.9 per cent in 1989. Canada accounted for only 2.8 per cent of Japanese manufactured imports in 1989, compared with 3.7 per cent in 1981. This fall is characteristic of almost all of the manufacturing industries (Table A-7).

A growing component of Japan's total imports is machinery and transportation equipment [Rao 1992]. Canadian exporters have been unable to take advantage of this trend. In the three machinery and equipment industries the share varied between 0.5 and 0.7 in 1989. In addition, Canada's share of Japanese nonelectrical and electrical machinery imports declined at an annual rate of over 5 per cent in the period 1971-89. However, Canada's share in transportation equipment imports has steadily risen, albeit from a quite small 0.1 per cent share in 1971 (Table A-7).

Canada possesses a sizable share of the Japanese market for paper and publishing and lumber and furniture products. Nevertheless, as in the EC market, Canada has generally lost ground to other countries in the resource-related industries in Japan.

Asian NICs

The share of the Asian NICs in total world goods trade increased dramatically in the period 1971-89, in large part due to their strong and growing competitive strength in manufactured products. Their share quadrupled from 2.1 per cent in 1971 to 8.1 per cent in 1989 (Table A-1). What is more, they have recorded quite significant increases in almost every manufacturing industry, although their exports are concentrated to a very great extent in three industries – textiles and clothing, electrical machinery, and miscellaneous manufactures.

Unlike its trade performance in the EC countries and Japanese markets, Canada's share of the imports by the Asian NICs has increased substantially over the years, reaching 1.6 percent by 1989. This has been largely because of Canada's growing share in the imports by the Asian NICs of goods produced by the resource-based industries. The importance of Canadian suppliers in the farming, mining, and lumber and furniture industries has increased markedly (Table A-8).

Nevertheless, as is the case with the EC countries and Japan, Canada accounts for only a very small proportion of the imports by the Asian NICs in the machinery industries (about 0.4 per cent). It should be noted that the importance of these imports in total imports by the Asian NIC has increased rapidly over the last 20 years.

Rest of the World

As for the rest of the world, of which the most significant countries are the non-EC countries, Australia and New Zealand, the Latin American NICs, the Middle East, China, and the Asian countries, it accounted for about 29 per cent of world merchandise exports in 1989 (Table A-1).

Canada's share of this large market is small and has declined, from 1.7 per cent in 1971 to 1.2 per cent in 1989. This fall is generally pervasive across all industries. As in the other markets, Canada's comparative advantage still lies mainly in the resource and resource-based manufacturing industries. But in these industries too, Canadian suppliers have been losing ground to other countries. In the electrical machinery industry, the largest and fastest growing component of imports by the rest of the world, Canada's share is very small and has been declining (Table A-9).

Canada's Merchandise Trade Balance

Canada's export strength lies mainly in the resource-related industries. In 1989, Canada enjoyed a surplus of almost US$30 billion in its trade of products from the mining, paper and publishing, primary metals, and lumber and furniture industries. In addition, it ran a surplus of about US$5 billion on transportation-equipment-related transactions. But huge deficits in the machinery, textiles, clothing, and leather, miscellaneous manufactures, and farming industries largely offset these surpluses. The result was a total merchandise trade deficit of US$4.4 billion (Table A-10).

Much of the total trade in 1989 reflects the deficit of the farming industry. Its trade balance steadily deteriorated in the 1980s, moving from a surplus of US$5 billion in 1981 to a deficit of US$14 billion in 1989. The deterioration was entirely due to the poor trade performance of the Canadian industry in the U.S. market (Tables A-11 to A-15). The large deterioration in cost competitiveness of Canada's farming sector against its U.S. counterpart could largely explain its poor trade performance in the U.S. market [Rao and Lemprière 1992*b*].

Domestic Sources of Canadian Demand

Apparent consumption (domestic output less exports plus imports) is used to represent domestic demand here.

The Canadian market is becoming more open, at least as measured by decreases in the extent to which domestic producers supply domestic demand. Canadian industries supplied about 64 per cent of total domestic demand in 1988, compared with 75 per cent in 1971. The share of Canadian firms in the domestic demand for the products of most manufacturing industries steadily declined over the period 1971-88 (Table A-16). In part this simply reflects the growing trade and investment linkages between Canada and other countries.

However, the domestic share of the high-tech machinery and equipment industries have declined at a much faster pace than the drop in the average domestic share (Table A-16). The domestic share of the transportation equipment industry fell from over 43 per cent in 1971 to about 30 per cent in 1988. The corresponding large increase in import penetration in these industries is consistent with the decline in the domestic producers' share in the world export markets already noted. In short, the trends in both export and import penetration strongly suggest that Canada is losing ground in its competitive battle (in terms of both cost and noncost factors) in these industries.

Import Penetration into Canada

The share of the United States in Canada's import in most industries declined over the period 1981-89. In the three machinery and equipment industries, where Canada lost considerable domestic market share to imports, the share of U.S. producers also declined significantly (Table A-17). The share of the EC countries in Canadian imports also fell during this period (Table A-18).

In contrast, the Japanese share in Canada's imports increased, and the increase was quite considerable in some industries. Much of this growth can be attributed to Japan's growing strength in nonelectrical and electrical machinery and transportation equipment. For instance, Japan's share of Canada's nonelectrical machinery imports increased from 2.1 per cent in 1971 to 7 per cent in 1989 (Table A-19).

The Asian NICs have also dramatically increased their share of the Canadian market over the last 20 years, entirely due to their growing strength in manufactured products. These countries' share of Canada's total imports increased from a mere 1.4 per cent in 1971 to almost 4.7 per cent in 1989. They now supply more than 30 per cent of Canada's imports of textiles, clothing, and leather products. And they seem to be gaining considerable ground in the high-tech industries – chemical products, nonelectrical and electrical machinery, and transportation equipment. Their share of Canada's electrical machinery imports rose tenfold between 1971 and 1989 (Table A-20).

As for the rest of the world, it supplied 8.5 per cent of Canada's merchandise imports in 1989, compared with 11.1 per cent in 1981. The decline reflects a large loss in its market share in the resource industries (farming and mining, including crude petroleum). On the other hand, its share of Canada's manufactured imports increased from 5.9 per cent in 1981 to over 7.8 per cent in 1989. Like the Asian NICs, the rest of the world has substantially increased its shares of Canada's high-tech imports (Table A-21).

Table A-1

Share in total world exports, by country/region, and growth in exports for major sectors, 1971-89

	Exporter	Share					Share growth,[1] 1971-89	Export growth,[1] 1971-89
		1971	1976	1981	1986	1989		
					(Per cent)			
Total manufacturing	Canada	5.2	3.8	3.8	4.2	4.0	–1.4	11.2
	United States	14.2	13.0	14.6	11.3	12.9	–0.6	12.2
	Japan	8.8	9.5	11.0	12.3	11.2	1.4	14.4
	European Community (12)	46.4	45.2	41.7	43.0	42.4	–0.5	12.3
	Asian NICs (4)	2.4	3.9	5.7	7.4	9.5	7.9	21.7
	Rest of the world	23.0	24.6	23.3	21.8	20.0	–0.8	12.0
	Total	100.0	100.0	100.0	100.0	100.0	–	12.8
Farming	Canada	3.7	3.2	4.1	3.6	2.6	–1.8	10.5
	United States	13.6	16.8	18.2	12.9	13.7	–	12.6
	Japan	1.2	1.2	1.0	1.2	1.1	–0.8	11.6
	European Community (12)	17.2	17.3	16.8	19.8	24.4	2.0	14.8
	Asian NICs (4)	1.8	2.3	3.0	3.1	4.1	4.5	17.6
	Rest of the world	62.4	59.3	56.9	59.4	54.2	–0.8	11.7
	Total	100.0	100.0	100.0	100.0	100.0	–	12.6
Mining	Canada	8.9	5.1	3.6	5.9	6.8	–1.5	9.0
	United States	6.3	3.4	3.4	4.8	5.8	–0.5	10.1
	Japan	0.1	0.1	0.1	0.3	0.3	4.9	16.2
	European Community (12)	9.2	5.1	8.9	12.6	11.2	1.1	11.9
	Asian NICs (4)	0.2	0.2	0.2	0.3	0.5	4.4	15.5
	Rest of the world	75.2	86.3	83.8	76.1	75.5	–	10.7
	Total	100.0	100.0	100.0	100.0	100.0	–	10.7

Total nonmanufacturing	Canada	5.7	4.3	4.0	4.7	4.0	–2.0	9.7
	United States	10.8	9.2	9.3	9.5	11.2	0.2	12.1
	Japan	0.8	0.6	0.5	0.8	0.8	0.1	12.0
	European Community (12)	14.2	10.5	12.1	17.0	20.5	2.1	14.2
	Asian NICs (4)	1.2	1.1	1.3	1.9	2.9	5.0	17.5
	Rest of the world	67.3	74.4	72.9	66.1	60.7	–0.6	11.3
	Total	100.0	100.0	100.0	100.0	100.0	–	11.9
All industries	Canada	5.3	4.0	3.8	4.3	4.0	–1.6	10.8
	United States	13.4	11.9	12.9	10.9	12.5	–0.4	12.2
	Japan	6.8	6.9	7.7	9.9	8.9	1.5	14.3
	European Community (12)	38.3	34.9	32.5	37.5	37.5	–0.1	12.5
	Asian NICs (4)	2.1	3.0	4.3	6.2	8.1	7.7	21.2
	Rest of the world	34.1	39.3	38.7	31.2	29.1	–0.9	11.6
	Total	100.0	100.0	100.0	100.0	100.0	–	12.6

[1] Compounded annual average growth rates.

SOURCE Estimates by the authors, based on data from Statistics Canada.

Table A-2

Share in world manufacturing exports, by country/region, and growth in exports for industries, 1971-89

	Exporter	Share 1971	1976	1981	1986	1989	Share growth,[1] 1971-89	Export growth,[1] 1971-89
					(Per cent)			
Food, beverages, and tobacco	Canada	2.9	1.9	2.2	2.2	2.0	-1.9	8.0
	United States	9.9	9.4	12.6	11.7	14.0	1.9	12.2
	Japan	1.0	0.3	0.7	0.5	0.6	-2.8	7.1
	European Community (12)	38.2	39.7	46.1	48.9	55.5	2.1	12.4
	Asian NICs (4)	1.3	1.3	1.5	2.2	3.3	5.3	15.9
	Rest of the world	46.7	47.4	36.9	34.6	24.6	-3.5	6.2
	Total	100.0	100.0	100.0	100.0	100.0	-	10.1
Paper and publishing	Canada	21.2	19.5	18.5	16.6	16.2	-1.5	10.8
	United States	14.6	13.7	15.1	11.8	13.7	-0.4	12.1
	Japan	2.6	2.3	2.5	2.9	2.4	-0.5	12.0
	European Community (12)	28.8	30.6	30.2	35.6	35.4	1.1	13.8
	Asian NICs (4)	0.8	1.2	1.6	2.3	2.9	7.3	20.7
	Rest of the world	32.0	32.7	32.0	30.9	29.5	-0.4	12.0
	Total	100.0	100.0	100.0	100.0	100.0	-	12.5
Chemical products	Canada	2.6	2.1	3.2	2.4	2.5	-0.1	13.5
	United States	16.7	14.8	18.2	13.4	15.4	-0.5	13.1
	Japan	6.1	5.5	4.9	5.3	5.8	-0.3	13.2
	European Community (12)	55.2	57.8	52.6	57.0	53.8	-0.1	13.4
	Asian NICs (4)	0.9	1.2	1.8	2.8	4.2	8.7	23.5
	Rest of the world	18.5	18.6	19.4	19.1	18.3	-0.1	13.5
	Total	100.0	100.0	100.0	100.0	100.0	-	13.6

Petroleum products	Canada	0.8	0.6	1.8	1.6	2.2	6.1	18.7
	United States	7.6	2.9	3.9	5.7	7.1	–0.4	11.4
	Japan	0.5	0.2	0.4	0.6	1.0	3.8	16.1
	European Community (12)	38.7	36.7	37.4	33.6	31.9	–1.1	10.6
	Asian NICs (4)	4.8	5.2	7.8	8.6	10.6	–4.5	16.9
	Rest of the world	47.6	54.4	48.6	49.8	47.3	–	11.8
	Total	100.0	100.0	100.0	100.0	100.0	–	11.8
Nonmetallic mineral products	Canada	1.0	0.8	1.0	1.3	1.3	1.5	14.7
	United States	8.7	7.3	8.3	5.8	5.9	–2.1	10.7
	Japan	5.5	5.0	6.0	5.7	4.5	–1.1	11.9
	European Community (12)	58.8	57.2	51.0	52.8	51.4	–0.7	12.3
	Asian NICs (4)	2.7	3.4	5.0	4.7	5.4	3.9	17.5
	Rest of the world	23.3	26.3	28.7	29.7	31.4	1.7	15.0
	Total	100.0	100.0	100.0	100.0	100.0	–	13.1
Primary metal products	Canada	6.9	4.6	4.9	5.0	4.9	–1.9	8.5
	United States	5.8	5.1	5.8	2.8	5.4	–0.4	10.2
	Japan	14.3	17.8	16.3	13.3	10.3	–1.8	8.5
	European Community (12)	44.4	43.7	41.5	44.0	43.4	–0.1	10.4
	Asian NICs (4)	0.4	0.9	2.8	3.5	4.9	14.4	26.5
	Rest of the world	28.1	27.9	28.6	31.5	31.2	0.6	11.2
	Total	100.0	100.0	100.0	100.0	100.0	–	10.6
Fabricated metal products	Canada	2.2	2.1	2.4	2.8	3.1	2.0	13.7
	United States	10.6	10.8	12.6	7.0	8.4	–1.3	10.0
	Japan	10.4	10.2	11.3	9.6	8.1	–1.4	10.0
	European Community (12)	50.9	50.8	47.5	50.4	50.5	–	11.4
	Asian NICs (4)	1.7	3.5	7.0	10.2	11.4	11.4	24.1
	Rest of the world	24.2	22.5	19.2	20.0	18.4	–1.5	9.8
	Total	100.0	100.0	100.0	100.0	100.0	–	11.5
Nonelectrical machinery	Canada	3.5	2.7	2.8	2.7	3.0	–0.9	10.9
	United States	20.7	20.8	22.7	14.3	16.0	–1.4	10.3

Table A-2 (cont'd.)

	Exporter	Share					Share growth,[1] 1971-89	Export growth,[1] 1971-89
		1971	1976	1981	1986	1989		
					(Per cent)			
	Japan	6.0	7.1	11.6	13.8	14.9	5.2	17.7
	European Community (12)	54.6	51.1	43.6	47.5	46.9	–0.8	10.9
	Asian NICs (4)	0.8	1.0	1.7	2.5	4.2	9.9	22.9
	Rest of the world	14.4	17.3	17.6	19.2	15.0	0.2	12.1
	Total	100.0	100.0	100.0	100.0	100.0	–	11.9
Electrical machinery	Canada	2.8	1.8	2.1	1.8	1.9	–1.9	15.0
	United States	19.4	16.7	18.6	16.0	17.1	–0.7	16.4
	Japan	14.3	18.9	21.7	23.9	21.5	2.3	19.9
	European Community (12)	49.2	43.6	35.4	33.5	30.0	–2.7	14.1
	Asian NICs (4)	2.9	6.5	9.6	12.1	17.5	10.5	29.6
	Rest of the world	11.5	12.6	12.6	12.7	12.1	0.3	17.6
	Total	100.0	100.0	100.0	100.0	100.0	–	17.2
Transportation equipment	Canada	11.5	8.1	6.8	10.5	9.0	–1.3	11.3
	United States	21.9	18.3	18.3	14.4	15.9	–1.8	10.8
	Japan	13.6	18.2	20.9	22.7	19.2	2.0	15.0
	European Community (12)	43.5	43.1	41.3	40.6	45.2	0.2	13.0
	Asian NICs (4)	0.3	0.8	2.1	2.4	2.7	13.6	28.1
	Rest of the world	9.2	11.5	10.7	9.3	7.9	–0.8	11.8
	Total	100.0	100.0	100.0	100.0	100.0	–	12.8
Textiles, clothing, and leather	Canada	0.8	0.5	0.6	0.6	0.5	–2.3	9.4
	United States	6.1	6.1	7.5	3.7	4.7	–1.4	10.4

	Japan	9.6	6.3	5.8	4.2	3.0	–6.3	5.0
	European Community (12)	46.3	41.6	36.6	39.3	36.6	–1.3	10.5
	Asian NICs (4)	8.5	14.4	17.5	21.0	24.0	5.9	18.6
	Rest of the world	28.7	31.1	32.0	31.2	31.3	0.5	12.5
	Total	100.0	100.0	100.0	100.0	100.0	–	12.0
Lumber and furniture	Canada	17.2	12.5	11.8	14.3	12.3	–1.8	11.0
	United States	6.4	8.4	8.1	6.5	8.2	1.4	14.6
	Japan	3.2	1.3	1.1	0.8	0.9	–6.8	5.4
	European Community (12)	27.7	31.5	32.9	35.8	36.7	1.6	14.8
	Asian NICs (4)	5.7	7.2	8.1	7.9	8.0	1.9	15.2
	Rest of the world	39.9	39.0	38.0	34.7	34.0	–0.9	12.1
	Total	100.0	100.0	100.0	100.0	100.0	–	13.1
Plastic and rubber products	Canada	2.7	3.0	3.2	3.9	3.1	0.9	15.7
	United States	14.0	11.8	12.5	10.4	9.9	–1.9	12.5
	Japan	10.7	9.6	11.1	9.2	9.8	–0.5	14.2
	European Community (12)	58.2	57.6	52.5	54.0	53.1	–0.5	14.1
	Asian NICs (4)	2.3	4.6	6.9	9.5	10.4	8.7	24.6
	Rest of the world	12.2	13.4	13.7	13.0	13.6	0.6	15.4
	Total	100.0	100.0	100.0	100.0	100.0	–	14.7
Miscellaneous manufactures	Canada	1.6	1.3	1.3	1.2	1.1	–2.1	12.0
	United States	16.9	16.3	17.8	13.0	14.8	–0.7	13.6
	Japan	13.5	11.2	15.0	15.7	12.8	–0.3	14.1
	European Community (12)	46.4	44.9	37.3	39.0	36.2	–1.4	12.8
	Asian NICs (4)	5.5	8.8	12.2	14.2	16.3	6.3	21.6
	Rest of the world	16.1	17.4	16.4	16.8	18.7	0.8	15.4
	Total	100.0	100.0	100.0	100.0	100.0	–	14.4
Total manufacturing	Canada	5.2	3.8	3.8	4.2	4.0	–1.4	11.2
	United States	14.2	13.0	14.6	11.3	12.9	–0.6	12.2

Table A-2 (concl'd.)

Exporter	Share 1971	1976	1981	1986	1989	Share growth,[1] 1971-89	Export growth,[1] 1971-89
				(Per cent)			
Japan	8.8	9.5	11.0	12.3	11.2	1.4	14.4
European Community (12)	46.4	45.2	41.7	43.0	42.4	–0.5	12.3
Asian NICs (4)	2.4	3.9	5.7	7.4	9.5	7.9	21.7
Rest of the world	23.0	24.6	23.3	21.8	20.0	–0.8	12.0
Total	100.0	100.0	100.0	100.0	100.0	–	12.8

[1] Compounded annual average growth rates.

Source Estimates by the authors, based on data from Statistics Canada.

Table A-3

Share in total world exports, by major sector, and growth in exports for major countries/regions, 1971-89

	Exporter	Share					Share growth,[1] 1971-89	Export growth,[1] 1971-89
		1971	1976	1981	1986	1989		
					(Per cent)			
Total manufacturing	Canada	73.1	68.0	67.9	76.9	77.6	0.3	11.2
	United States	80.0	77.0	77.7	81.4	80.0	–	12.2
	Japan	97.0	97.6	98.0	98.2	97.9	0.1	14.4
	European Community (12)	90.7	91.1	88.4	90.3	87.7	–0.2	12.3
	Asian NICs (4)	85.6	89.5	90.6	93.4	91.8	0.4	21.7
	Rest of the world	50.5	44.1	41.4	54.8	53.3	0.3	12.0
	Total	74.9	70.5	68.9	78.6	77.6	0.2	12.8
Farming	Canada	10.6	10.3	13.3	10.3	10.1	–0.3	10.5
	United States	15.7	18.3	17.5	14.8	16.8	0.4	12.6
	Japan	2.8	2.2	1.7	1.6	1.8	–2.4	11.6
	European Community (12)	6.9	6.4	6.4	6.6	10.0	2.1	14.8
	Asian NICs (4)	13.4	9.7	8.6	6.2	7.7	–3.0	17.6
	Rest of the world	28.3	19.4	18.2	23.7	28.5	–	11.7
	Total	15.4	12.9	12.4	12.5	15.3	–	12.6
Mining	Canada	16.0	21.3	17.5	11.9	11.9	–1.7	9.0
	United States	4.5	4.7	4.9	3.9	3.2	–1.8	10.1
	Japan	0.2	0.2	0.3	0.2	0.3	1.5	16.2
	European Community (12)	2.3	2.4	5.1	2.9	2.1	–0.5	11.9
	Asian NICs (4)	1.1	0.8	0.7	0.4	0.4	–4.7	15.5
	Rest of the world	21.1	36.3	40.2	21.3	18.0	–0.9	10.7
	Total	9.5	16.5	18.6	8.7	7.0	–1.7	10.7

Table A-3 (concl'd.)

	Exporter	Share 1971	1976	1981	1986	1989	Share growth,[1] 1971-89	Export growth,[1] 1971-89
		(Millions of US$)						(Per cent)
All industries	Canada	19,095	39,564	78,295	95,030	121,277	. . .	10.8
	United States	48,009	118,778	263,669	239,908	379,953	. . .	12.2
	Japan	24,305	68,544	157,789	271,281	271,074	. . .	14.3
	European Community (12)	137,654	349,458	663,737	823,622	1,140,062	. . .	12.5
	Asian NICs (4)	7,654	30,437	88,307	136,813	244,961	. . .	21.2
	Rest of the world	122,353	393,386	790,964	686,663	886,854	. . .	11.6
	Total	359,071	1,000,167	2,042,762	2,199,318	3,044,182	. . .	12.6

[1] Compounded annual average growth rates.

Source Estimates by the authors, based on data from Statistics Canada.

Table A-4

Share in world manufacturing exports, by industry, and growth in exports for major countries/regions, 1971-89

		Share					Share growth,[1] 1971-89	Export growth,[1] 1971-89
	Exporter	1971	1976	1981	1986	1989		
					(Per cent)			
Food, beverages, and tobacco	Canada	5.3	4.4	4.8	3.5	3.2	–2.9	8.0
	United States	6.6	6.5	7.1	7.1	6.7	–	12.2
	Japan	1.1	0.3	0.5	0.3	0.3	–6.4	7.1
	European Community (12)	7.8	7.9	9.0	7.8	8.0	0.1	12.4
	Asian NICs (4)	5.1	3.1	2.1	2.0	2.1	–4.8	15.9
	Rest of the world	19.4	17.3	13.0	10.9	7.5	–5.1	6.2
	Total	9.5	9.0	8.2	6.9	6.1	–2.4	10.1
Paper and publishing	Canada	16.1	18.2	16.6	13.2	15.2	–0.3	10.8
	United States	4.0	3.8	3.5	3.5	4.0	–0.1	12.1
	Japan	1.2	0.8	0.8	0.8	0.8	–2.1	12.0
	European Community (12)	2.4	2.4	2.4	2.8	3.1	1.4	13.8
	Asian NICs (4)	1.3	1.1	0.9	1.0	1.1	–0.8	20.7
	Rest of the world	5.5	4.7	4.6	4.8	5.5	–	12.0
	Total	3.9	3.6	3.4	3.4	3.7	–0.3	12.5
Chemical products	Canada	4.5	5.5	8.3	6.1	6.6	2.1	13.5
	United States	10.8	11.1	12.7	12.5	12.4	0.8	13.1
	Japan	6.4	5.7	4.5	4.5	5.3	–1.0	13.2
	European Community (12)	10.9	12.5	12.8	13.9	13.2	1.1	13.4
	Asian NICs (4)	3.6	2.9	3.3	4.0	4.6	1.5	23.5
	Rest of the world	7.4	7.4	8.5	9.2	9.5	1.4	13.5
	Total	9.2	9.8	10.2	10.5	10.4	0.7	13.6

Table A-4 (cont'd.)

	Exporter	Share 1971	1976	1981	1986	1989	Share growth,[1] 1971-89	Export growth,[1] 1971-89
					(Per cent)			
Petroleum products	Canada	0.5	0.8	3.2	1.5	1.7	6.8	18.7
	United States	1.9	1.2	1.7	2.0	1.7	–0.7	11.4
	Japan	0.2	0.1	0.2	0.2	0.3	1.4	16.1
	European Community (12)	3.0	4.3	5.8	3.1	2.3	–1.4	10.6
	Asian NICs (4)	7.1	7.2	8.9	4.7	3.4	–3.9	16.9
	Rest of the world	7.5	11.8	13.5	9.2	7.3	–0.2	11.8
	Total	3.6	5.3	6.5	4.0	3.1	–0.9	11.8
Nonmetallic mineral products	Canada	0.5	0.5	0.7	0.8	0.9	3.2	14.7
	United States	1.6	1.5	1.5	1.3	1.3	–1.4	10.7
	Japan	1.7	1.4	1.4	1.1	1.1	–2.2	11.9
	European Community (12)	3.4	3.4	3.2	3.0	3.4	–	12.3
	Asian NICs (4)	3.0	2.4	2.3	1.6	1.6	–3.5	17.5
	Rest of the world	2.7	2.8	3.2	3.4	4.3	2.7	15.0
	Total	2.7	2.7	2.6	2.5	2.8	0.2	13.1
Primary metal products	Canada	13.2	10.9	10.7	7.5	8.5	–2.5	8.5
	United States	4.0	3.5	3.2	1.6	2.9	–1.8	10.2
	Japan	16.2	17.0	12.1	6.9	6.3	–5.1	8.5
	European Community (12)	9.5	8.7	8.1	6.5	7.1	–1.6	10.4
	Asian NICs (4)	1.8	2.1	4.0	3.1	3.5	3.9	26.5
	Rest of the world	12.1	10.2	10.0	9.2	10.7	–0.7	11.2
	Total	9.9	9.0	8.1	6.4	6.9	–2.0	10.6
Fabricated metal products	Canada	1.2	1.6	1.9	1.6	1.8	2.3	13.7
	United States	2.2	2.4	2.5	1.5	1.5	–1.9	10.0

	Japan	3.5	3.1	3.0	1.9	1.7	-3.9	10.0
	European Community (12)	3.2	3.3	3.3	2.9	2.8	-0.7	11.4
	Asian NICs (4)	2.0	2.6	3.6	3.4	2.8	2.0	24.1
	Rest of the world	3.1	2.7	2.4	2.3	2.2	-1.9	9.8
	Total	2.9	2.9	2.9	2.5	2.4	-1.2	11.5
Nonelectrical machinery	Canada	9.8	10.5	10.2	8.2	9.3	-0.3	10.9
	United States	21.1	23.4	21.3	15.9	15.4	-1.7	10.3
	Japan	10.0	10.9	14.4	14.1	16.5	2.9	17.7
	European Community (12)	17.1	16.5	14.3	13.9	13.8	-1.2	10.9
	Asian NICs (4)	4.6	3.8	4.1	4.2	5.5	1.0	22.9
	Rest of the world	9.1	10.3	10.4	11.1	9.3	0.1	12.1
	Total	14.5	14.6	13.7	12.6	12.4	-0.8	11.9
Electrical machinery	Canada	4.1	4.0	5.5	5.9	7.5	3.4	15.0
	United States	10.5	11.1	12.7	19.6	20.4	3.8	16.4
	Japan	12.5	17.1	19.7	26.8	29.3	4.8	19.9
	European Community (12)	8.1	8.3	8.5	10.8	10.8	1.6	14.1
	Asian NICs (4)	9.1	14.4	16.8	22.6	28.2	6.5	29.6
	Rest of the world	3.9	4.4	5.4	8.1	9.3	5.0	17.6
	Total	7.7	8.6	10.0	13.8	15.3	3.9	17.2
Transportation equipment	Canada	32.3	31.2	26.0	39.0	32.8	0.1	11.3
	United States	22.4	20.7	18.2	20.1	17.9	-1.3	10.8
	Japan	22.5	28.2	27.6	28.9	24.7	0.5	15.0
	European Community (12)	13.6	14.0	14.4	14.9	15.4	0.7	13.0
	Asian NICs (4)	1.6	3.0	5.4	5.2	4.1	5.3	28.1
	Rest of the world	5.8	6.9	6.7	6.7	5.7	-0.1	11.8
	Total	14.5	14.7	14.5	15.7	14.4	–	12.8
Textiles, clothing, and leather	Canada	1.8	1.3	1.6	1.4	1.4	-1.6	9.4
	United States	4.9	4.8	4.9	3.3	3.7	-1.6	10.4
	Japan	12.7	6.8	5.1	3.5	2.7	-8.2	5.0

Table A-4 (concl'd.)

	Exporter	Share 1971	1976	1981	1986	1989	Share growth,[1] 1971-89	Export growth,[1] 1971-89
					(Per cent)			
	European Community (12)	11.5	9.4	8.4	9.4	8.7	−1.5	10.5
	Asian NICs (4)	40.2	38.1	29.6	29.2	25.3	−2.5	18.6
	Rest of the world	14.4	12.9	13.2	14.7	15.7	0.5	12.5
	Total	11.5	10.2	9.6	10.3	10.1	−0.7	12.0
Lumber and furniture	Canada	7.8	7.8	7.0	7.5	7.5	−0.2	11.0
	United States	1.1	1.5	1.2	1.3	1.6	2.1	14.6
	Japan	0.9	0.3	0.2	0.1	0.2	−7.7	5.4
	European Community (12)	1.4	1.7	1.8	1.8	2.1	2.3	14.8
	Asian NICs (4)	5.5	4.5	3.2	2.4	2.0	−5.4	15.2
	Rest of the world	4.1	3.8	3.6	3.5	4.1	0.1	12.1
	Total	2.4	2.4	2.2	2.2	2.4	0.2	13.1
Plastic and rubber products	Canada	0.8	1.3	1.5	1.8	1.6	4.1	15.7
	United States	1.5	1.5	1.5	1.7	1.6	0.3	12.5
	Japan	1.9	1.6	1.8	1.4	1.8	−0.2	14.2
	European Community (12)	1.9	2.0	2.2	2.4	2.6	1.6	14.1
	Asian NICs (4)	1.5	1.9	2.1	2.4	2.3	2.4	24.6
	Rest of the world	0.8	0.9	1.0	1.1	1.4	3.0	15.4
	Total	1.5	1.6	1.7	1.9	2.1	1.6	14.7
Miscellaneous manufactures	Canada	1.9	2.0	2.1	2.2	2.1	0.7	12.0
	United States	7.3	7.1	7.8	8.5	9.1	1.2	13.6
	Japan	9.4	6.7	8.7	9.4	9.0	−0.3	14.1
	European Community (12)	6.1	5.6	5.7	6.7	6.7	0.5	12.8
	Asian NICs (4)	13.7	12.9	13.7	14.2	13.5	−0.1	21.6

	Rest of the world	4.3	4.0	4.5	5.7	7.4	3.0	15.4
	Total	6.1	5.6	6.4	7.4	7.9	1.4	14.4
				(Millions of US$)				(Per cent)
Total manufacturing	Canada	13,954	26,887	53,132	73,115	94,100	. . .	11.2
	United States	38,289	91,488	204,840	195,211	303,767	. . .	12.2
	Japan	23,568	66,904	154,673	213,410	265,408	. . .	14.4
	European Community (12)	124,876	318,505	586,663	743,574	1,000,278	. . .	12.3
	Asian NICs (4)	6,548	27,231	80,042	127,804	224,900	. . .	21.7
	Rest of the world	61,799	173,585	327,476	376,162	472,501	. . .	12.0
	Total	269,034	704,601	1,406,826	1,729,275	2,360,952	. . .	12.8

1 Compounded annual average growth rates.

SOURCE Estimates by the authors, based on data from Statistics Canada.

Table A-5

Canada's share of U.S. Imports, by Industry, 1971-89

	Share				Share growth,[1] 1971-89
	1971	1981	1986	1989	
			(Per cent)		
Food, beverages, and tobacco	10.1	10.3	12.5	15.4	2.4
Paper and publishing	83.3	84.8	70.0	70.3	–0.9
Chemical products	25.5	29.0	18.8	19.4	–1.5
Petroleum products	3.5	13.4	9.7	10.9	6.5
Nonmetallic mineral products	5.0	5.9	6.0	6.5	1.4
Primary metal products	25.5	21.1	25.3	26.2	0.1
Fabricated metal products	12.1	16.0	14.4	16.2	1.7
Nonelectrical machinery	33.4	22.9	14.7	15.4	–4.2
Electrical machinery	13.6	9.9	6.0	7.1	–3.6
Transportation equipment	47.2	31.4	31.8	35.0	–1.7
Textiles, clothing, and leather	3.6	2.3	2.1	1.8	–3.6
Lumber and furniture	59.3	55.5	49.2	47.2	–1.3
Plastic and rubber products	14.8	24.7	22.3	17.8	1.0
Miscellaneous manufactures	6.1	5.0	4.0	3.6	–2.8
Total manufacturing	26.7	21.3	18.5	18.3	–2.1
Farming	13.0	23.8	20.6	19.0	2.1
Mining	45.9	12.6	21.5	18.1	–5.0
Utilities	100.0	100.0	100.0	87.8	–0.7
Total nonmanufacturing	31.4	15.6	22.4	19.1	–2.7
All industries	27.4	19.4	19.0	18.4	–2.2

1 Compounded annual average growth rates.

Source Estimates by the authors, based on data from Statistics Canada.

Table A-6

Canada's share of imports by the European Community, by industry, 1971-89

	Share				Share growth,[1] 1971-89
	1971	1981	1986	1989	
			(Per cent)		
Food, beverages, and tobacco	1.0	0.7	0.3	0.2	–7.4
Paper and publishing	7.6	7.7	4.3	5.3	–1.9
Chemical products	1.0	1.4	0.7	0.4	–4.3
Petroleum products	0.1	0.3	0.1	0.1	4.9
Nonmetallic mineral products	0.2	0.2	0.1	0.2	0.6
Primary metal products	4.3	1.8	0.9	1.2	–7.0
Fabricated metal products	0.5	0.6	0.3	0.4	–2.1
Nonelectrical machinery	0.6	0.7	0.6	0.7	0.5
Electrical machinery	0.9	0.8	0.4	0.6	–2.4
Transportation equipment	0.5	0.3	0.3	0.3	–2.7
Textiles, clothing, and leather	0.4	0.3	0.1	0.2	–5.3
Lumber and furniture	3.9	4.0	2.6	3.3	–0.9
Plastic and rubber products	0.9	0.4	0.1	0.2	–9.4
Miscellaneous manufactures	0.7	0.6	0.4	0.4	–2.5
Total manufacturing	1.5	1.1	0.6	0.8	–3.7
Farming	4.3	2.9	1.6	1.6	–5.3
Mining	3.8	1.2	1.7	2.2	–2.9
Utilities	. . .	. . .	. . .	. . .	. . .
Total nonmanufacturing	4.0	1.7	1.6	1.9	–4.1
All industries	2.1	1.3	0.8	0.9	–4.4

[1] Compounded annual average growth rates.

Source Estimates by the authors, based on data from Statistics Canada.

Table A-7

Canada's share of Japanese imports, by industry, 1971-89

	Share				Share growth,[1] 1971-89
	1971	1981	1986	1989	
			(Per cent)		
Food, beverages, and tobacco	4.7	5.9	3.7	3.1	–2.2
Paper and publishing	34.9	27.8	26.3	25.8	–1.7
Chemical products	2.6	3.2	2.3	2.5	–0.3
Petroleum products	–	0.2	0.3	0.4	23.3
Nonmetallic mineral products	0.3	0.1	0.1	0.1	–3.6
Primary metal products	7.3	4.6	3.0	2.8	–5.2
Fabricated metal products	1.2	3.5	2.9	0.6	–3.4
Nonelectrical machinery	1.1	0.8	0.5	0.7	–3.0
Electrical machinery	0.9	1.1	0.8	0.5	–3.1
Transportation equipment	0.1	0.4	0.6	0.7	12.4
Textiles, clothing, and leather	0.1	0.3	0.1	0.1	0.4
Lumber and furniture	19.0	29.5	20.8	17.4	–0.5
Plastic and rubber products	7.4	2.7	1.6	0.9	–11.1
Miscellaneous manufactures	1.0	0.5	0.5	0.5	–4.3
Total manufacturing	3.4	3.7	2.8	2.8	–1.0
Farming	6.9	6.7	5.7	6.8	–0.1
Mining	7.4	2.3	4.5	5.3	–1.9
Utilities	...	...	...	...	...
Total nonmanufacturing	7.2	3.3	5.0	5.9	–1.1
All industries	5.3	3.4	3.9	3.9	–1.6

1 Compounded annual average growth rates.

Source Estimates by the authors, based on data from Statistics Canada.

Table A-8

Canada's share of imports by the Asian NICs, by industry, 1971-89

	Share				Share growth,[1] 1971-89
	1971	1981	1986	1989	
			(Per cent)		
Food, beverages, and tobacco	0.7	1.8	2.7	1.6	4.8
Paper and publishing	8.5	8.9	7.0	8.9	0.2
Chemical products	0.9	2.0	1.7	2.0	4.7
Petroleum products	–	–	0.1	0.1	–
Nonmetallic mineral products	0.1	0.1	0.1	0.4	10.9
Primary metal products	1.3	2.0	2.9	3.2	5.2
Fabricated metal products	0.5	0.9	0.4	0.6	0.6
Nonelectrical machinery	0.5	0.5	0.4	0.4	−1.6
Electrical machinery	0.5	0.5	0.5	0.4	−1.2
Transportation equipment	0.8	0.2	0.5	1.1	1.7
Textiles, clothing, and leather	0.1	0.4	0.3	0.3	5.8
Lumber and furniture	0.2	0.7	1.0	1.5	12.1
Plastic and rubber products	0.3	1.8	2.7	0.7	5.4
Miscellaneous manufactures	0.1	0.3	0.6	0.3	3.7
Total manufacturing	0.7	1.0	1.0	1.0	2.3
Farming	0.9	0.7	1.9	5.0	10.2
Mining	0.6	1.2	3.8	4.2	11.2
Utilities	. . .	. . .	. . .	. . .	. . .
Total nonmanufacturing	0.7	1.1	3.0	4.6	10.7
All industries	0.7	1.0	1.4	1.6	4.6

[1] Compounded annual average growth rates.

SOURCE Estimates by the authors, based on data from Statistics Canada.

Table A-9

Canada's share of imports by the rest of the world, by industry, 1971-89

	Share				Share growth,[1] 1971-89
	1971	1981	1986	1989	
			(Per cent)		
Food, beverages, and tobacco	2.0	1.5	1.0	1.0	-4.0
Paper and publishing	6.8	6.0	5.1	5.3	-1.5
Chemical products	0.9	1.0	0.8	1.2	1.7
Petroleum products	0.1	0.5	0.2	0.3	7.8
Nonmetallic mineral products	0.4	0.3	0.1	0.2	-2.3
Primary metal products	2.4	1.3	0.9	1.8	-1.6
Fabricated metal products	0.9	1.0	0.6	0.9	-0.1
Nonelectrical machinery	0.8	0.9	0.9	0.9	0.3
Electrical machinery	1.2	0.8	0.7	0.7	-3.0
Transportation equipment	1.6	2.4	1.2	1.0	-2.8
Textiles, clothing, and leather	0.5	0.5	0.3	0.4	-0.9
Lumber and furniture	3.2	2.5	1.4	2.2	-2.1
Plastic and rubber products	1.3	1.0	1.1	0.8	-2.7
Miscellaneous manufactures	0.7	0.7	0.4	0.4	-2.9
Total manufacturing	1.4	1.3	0.9	1.0	-1.5
Farming	2.3	2.7	1.8	1.1	-4.2
Mining	4.3	1.7	3.5	5.7	1.5
Utilities	...	...	...	...	...
Total nonmanufacturing	2.6	2.3	2.1	1.4	-3.3
All industries	1.7	1.6	1.2	1.2	-2.1

[1] Compounded annual average growth rates.

SOURCE Estimates by the authors, based on data from Statistics Canada.

Table A-10

Canada's total trade balance, 1971-89

	1971	1976	1981	1986	1989
			(Millions of US$)		
Food, beverages, and tobacco	158	–371	390	285	101
Paper and publishing	1,859	3,899	7,287	7,980	11,350
Chemical products	–205	–425	765	347	–49
Petroleum products	–132	11	1,229	284	287
Nonmetallic mineral products	–194	–433	–634	–624	–709
Primary metal products	1,110	1,547	2,675	3,559	4,305
Fabricated metal products	–243	–462	–587	–263	–769
Nonelectrical machinery	–1,263	–3,348	–5,523	–5,083	–6,301
Electrical machinery	–644	–1,710	–2,868	–4,583	–8,601
Transportation equipment	584	–12	–53	7,081	4,898
Textiles, clothing, and leather	–772	–1,939	–2,233	–3,088	–4,418
Lumber and furniture	914	1,507	2,902	4,617	5,467
Plastic and rubber products	–139	–247	–268	73	–611
Miscellaneous manufactures	–627	–1,386	–2,502	–2,627	–4,624
Total manufacturing	405	–3,368	578	7,957	327
Farming	749	1,535	5,013	1,845	–14,125
Mining	1,976	4,151	7,168	7,499	8,992
Utilities	40	160	1,048	844	387
Total nonmanufacturing	2,765	5,846	13,229	10,188	–4,746
All industries	3,170	2,478	13,807	18,145	–4,419

SOURCE Estimates by the authors, based on data from Statistics Canada.

Table A-11

Canada's trade balance with the United States, 1971-89

	1971	1976	1981	1986	1989
			(Millions of US$)		
Food, beverages, and tobacco	248	−125	154	740	576
Paper and publishing	1,254	2,320	4,362	5,671	7,070
Chemical products	−236	−381	−195	157	−458
Petroleum products	−2	52	1,080	513	845
Nonmetallic mineral products	−106	−259	−344	−156	−34
Primary metal products	656	1,091	2,611	3,483	3,549
Fabricated metal products	−155	−390	−523	139	−122
Nonelectrical machinery	−1,004	−2,897	−5,043	−2,912	−3,143
Electrical machinery	−495	−1,306	−2,434	−2,796	−5,151
Transportation equipment	812	130	−261	10,308	9,077
Textiles, clothing, and leather	−206	−737	−919	−135	−569
Lumber and furniture	770	1,134	1,931	3,992	3,816
Plastic and rubber products	−118	−152	−170	299	−109
Miscellaneous manufactures	−383	−893	−1,730	−1,080	−2,206
Total manufacturing	1,037	−2,413	−1,483	18,223	13,140
Farming	−599	−1,049	−861	−1,899	−19,319
Mining	1,296	4,588	6,288	4,957	6,382
Utilities	40	160	1,048	844	387
Total nonmanufacturing	737	3,699	6,475	3,902	−12,550
All industries	1,774	1,286	4,992	22,125	590

Source Estimates by the authors, based on data from Statistics Canada.

Table A-12

Canada's trade balance with the European Community, 1971-89

	1971	1976	1981	1986	1989
			(Millions of US$)		
Food, beverages, and tobacco	−13	−75	−37	−366	−537
Paper and publishing	310	946	1,469	959	1,969
Chemical products	−36	−153	262	−271	−653
Petroleum products	−7	6	81	−70	−199
Nonmetallic mineral products	−63	−118	−186	−286	−384
Primary metal products	368	352	2	−115	175
Fabricated metal products	−42	−67	−68	−175	−208
Nonelectrical machinery	−275	−475	−734	−1,274	−1,669
Electrical machinery	−80	−94	65	−255	−27
Transportation equipment	−210	−223	−357	−984	−1,702
Textiles, clothing, and leather	−239	−333	−276	−850	−854
Lumber and furniture	107	248	489	290	642
Plastic and rubber products	−20	−62	−87	−143	−193
Miscellaneous manufactures	−126	−200	−193	−453	−544
Total manufacturing	−327	−248	430	−3,992	−4,184
Farming	580	691	1,287	538	701
Mining	599	1,074	1,394	656	454
Utilities	...	...	...	...	...
Total nonmanufacturing	1,179	1,765	2,681	1,194	1,155
All industries	852	1,517	3,111	−2,799	−3,030

Source Estimates by the authors, based on data from Statistics Canada.

Table A-13

Canada's trade balance with Japan, 1971-89

	1971	1976	1981	1986	1989
			(Millions of US$)		
Food, beverages, and tobacco	52	162	339	253	383
Paper and publishing	67	199	410	520	1,028
Chemical products	10	17	125	78	205
Petroleum products	–	2	12	15	32
Nonmetallic mineral products	–14	–29	–51	–63	–77
Primary metal products	–74	–92	–126	15	241
Fabricated metal products	–30	–61	–71	–59	–108
Nonelectrical machinery	–43	–119	–276	–876	–1,015
Electrical machinery	–118	–370	–612	–1,172	–1,816
Transportation equipment	–219	–403	–1,301	–2,162	–2,668
Textiles, clothing, and leather	–119	–109	–86	–124	–90
Lumber and furniture	32	152	360	385	988
Plastic and rubber products	–13	–38	–65	–90	–161
Miscellaneous manufactures	–79	–152	–350	–464	–600
Total manufacturing	–549	–842	–1,693	–3,745	–3,657
Farming	217	716	1,191	1,337	2,052
Mining	364	1,095	1,378	1,586	2,196
Utilities	...	...	...	...	...
Total nonmanufacturing	580	1,811	2,569	2,923	4,248
All industries	31	969	876	–822	591

Source Estimates by the authors, based on data from Statistics Canada.

Table A-14

Canada's trade balance with the Asian NICs, 1971-89

	1971	1976	1981	1986	1989
			(Millions of US $)		
Food, beverages, and tobacco	3	24	63	113	106
Paper and publishing	18	32	128	149	348
Chemical products	5	32	122	135	308
Petroleum products	–	–	–2	–7	–7
Nonmetallic mineral products	–2	–7	–22	–34	–51
Primary metal products	7	29	62	131	330
Fabricated metal products	–3	–24	–58	–141	–278
Nonelectrical machinery	5	2	–	–75	–175
Electrical machinery	–11	–124	–232	–494	–1,445
Transportation equipment	4	–15	–72	–329	–173
Textiles, clothing, and leather	–106	–492	–683	–1,235	–1,661
Lumber and furniture	–24	–60	–59	–69	–103
Plastic and rubber products	–2	–13	–25	–67	–170
Miscellaneous manufactures	–30	–120	–304	–514	–852
Total manufacturing	–135	–738	–1,082	–2,437	–3,822
Farming	–11	–59	–51	55	697
Mining	10	34	262	442	605
Utilities	...	...	...	...	...
Total nonmanufacturing	–1	–25	211	497	1,302
All industries	–137	–763	–871	–1,940	–2,520

Source Estimates by the authors, based on data from Statistics Canada.

Table A-15

Canada's trade balance with the rest of the world, 1971-89

	1971	1976	1981	1986	1989
			(Millions of US$)		
Food, beverages, and tobacco	−133	−357	−129	−456	−427
Paper and publishing	210	404	919	681	935
Chemical products	52	60	451	249	550
Petroleum products	−123	−48	59	−167	−384
Nonmetallic mineral products	−9	−21	−30	−85	−163
Primary metal products	153	168	125	47	10
Fabricated metal products	−13	79	132	−27	−53
Nonelectrical machinery	54	141	530	54	−300
Electrical machinery	59	184	345	135	−162
Transportation equipment	196	499	1,938	247	364
Textiles, clothing, and leather	−102	−267	−270	−744	−1,245
Lumber and furniture	29	34	181	19	124
Plastic and rubber products	15	18	79	73	21
Miscellaneous manufactures	−10	−20	75	−117	−422
Total manufacturing	379	873	4,406	−92	−1,150
Farming	562	1,236	3,446	1,814	1,745
Mining	−292	−2,640	−2,153	−142	−645
Utilities	. . .	. . .	. . .	. . .	. . .
Total nonmanufacturing	270	−1,404	1,293	1,672	1,100
All industries	649	−531	5,699	1,580	−51

SOURCE Estimates by the authors, based on data from Statistics Canada.

Table A-16

Domestic share in Canadian apparent demand, and growth in apparent demand, by industry, 1971-88

	Share			Share growth,[1] 1971-88	Demand growth,[1] 1971-88
	1971	1981	1988		
			(Per cent)		
Food, beverages, and tobacco	93.9	92.3	92.0	–0.1	8.3
Paper and publishing	89.9	86.5	86.3	–0.2	10.0
Chemical products	73.4	68.4	67.8	–0.5	10.8
Petroleum products	91.2	97.3	92.5	0.1	9.3
Nonmetallic mineral products	84.6	78.6	77.2	–0.5	8.2
Primary metal products	81.4	75.8	79.7	–0.1	9.6
Fabricated metal products	89.3	85.7	85.1	–0.3	8.4
Nonelectrical machinery	12.3	9.4	0.5	–16.8	9.9
Electrical machinery	69.1	52.3	39.7	–3.2	10.7
Transportation equipment	43.5	29.8	29.9	–2.2	10.6
Textiles, clothing, and leather	78.3	73.4	66.1	–1.0	7.5
Lumber and furniture	91.8	87.3	87.3	–0.3	9.8
Plastic and rubber products	81.0	75.9	74.2	–0.5	11.1
Miscellaneous manufactures	52.2	41.7	36.5	–2.1	9.9
Total manufacturing	74.2	68.6	63.7	–0.9	9.5
Farming	77.5	71.9	41.8	–3.6	11.1
Mining	65.9	67.3	78.0	1.0	11.7
Utilities	99.5	99.9	99.7	–	12.1
Total nonmanufacturing	78.9	75.1	65.9	–1.1	11.5
All industries	75.1	70.1	64.2	–0.9	9.9

1 Compounded annual average growth rates.

Source Estimates by the authors, based on data from Statistics Canada.

Table A-17

U.S. share in Canadian imports, by industry, 1971-89

	Share				Share growth,[1] 1971-89	Import growth,[1] 1971-89
	1971	1981	1986	1989		
	(Per cent)					
Food, beverages, and tobacco	31.9	46.4	43.0	48.0	2.3	11.7
Paper and publishing	85.4	90.2	80.1	81.1	–0.3	11.5
Chemical products	77.2	79.0	68.6	72.9	–0.3	11.5
Petroleum products	34.5	61.6	63.0	49.0	2.0	13.1
Nonmetallic mineral products	61.5	64.1	56.8	49.2	–1.2	9.0
Primary metal products	58.1	49.8	48.7	56.4	–0.2	9.1
Fabricated metal products	67.7	76.6	60.2	64.2	–0.3	10.2
Nonelectrical machinery	81.0	83.4	68.9	68.1	–1.0	9.1
Electrical machinery	74.1	76.8	69.2	68.1	–0.5	14.7
Transportation equipment	86.8	84.8	79.4	78.5	–0.6	10.4
Textiles, clothing, and leather	34.6	41.2	20.4	24.5	–1.9	7.9
Lumber and furniture	64.3	75.7	61.6	69.4	0.4	13.6
Plastic and rubber products	75.9	75.3	66.7	68.7	–0.5	12.1
Miscellaneous manufactures	62.6	66.8	53.7	54.8	–0.7	11.0
Total manufacturing	72.0	74.8	66.5	66.4	–0.5	10.8
Farming	80.1	80.8	81.9	92.0	0.8	19.2
Mining	46.3	41.6	45.5	38.2	–1.1	8.1
Utilities	100.0	100.0	100.0	100.0	–	16.9
Total nonmanufacturing	64.8	59.2	70.2	82.9	1.4	17.1
All industries	71.0	72.0	67.1	70.6	–	12.1

[1] Compounded annual average growth rates.

SOURCE Estimates by the authors, based on data from Statistics Canada.

Table A-18

Share of the European Community in Canadian Imports, by Industry, 1971-89

	Share				Share growth,[1] 1971-89	Import growth,[1] 1971-89
	1971	1981	1986	1989		
			(Per cent)			
Food, beverages, and tobacco	21.5	18.1	23.1	25.2	0.9	10.1
Paper and publishing	12.1	7.6	12.1	11.6	–0.2	11.6
Chemical products	15.7	13.9	20.5	18.1	0.8	12.7
Petroleum products	4.4	10.5	11.3	17.2	7.9	19.7
Nonmetallic mineral products	26.0	21.0	25.8	27.9	0.4	10.8
Primary metal products	16.2	21.3	25.3	4.8	–6.5	9.7
Fabricated metal products	13.8	9.0	15.5	11.9	–0.8	9.6
Nonelectrical machinery	13.5	9.7	15.0	15.7	0.9	11.1
Electrical machinery	12.2	5.5	6.9	4.8	–5.0	9.5
Transportation equipment	6.8	3.9	5.7	8.1	1.0	12.2
Textiles, clothing, and leather	28.6	14.7	23.1	17.6	–2.7	7.1
Lumber and furniture	8.1	6.7	16.1	12.5	2.4	15.9
Plastic and rubber products	14.6	11.6	13.0	10.7	–1.7	10.8
Miscellaneous manufactures	19.1	10.3	15.0	12.6	–2.3	9.3
Total manufacturing	13.6	9.5	12.4	10.4	–1.5	10.6
Farming	5.2	5.4	5.0	2.0	–5.1	12.2
Mining	1.6	4.4	17.6	23.6	16.1	26.9
Utilities	...	...	...	...	...	...
Total nonmanufacturing	3.5	4.8	9.0	5.7	2.7	18.6
All industries	12.1	8.6	11.9	10.4	–0.8	11.2

[1] Compounded annual average growth rates.

Source Estimates by the authors, based on data from Statistics Canada.

Table A-19

Japan's share in Canadian imports, by industry, 1971-89

	Share				Share growth,[1] 1971-89	Import growth,[1] 1971-89
	1971	1981	1986	1989		
	(Per cent)					
Food, beverages, and tobacco	0.4	0.2	0.3	0.4	–0.7	8.4
Paper and publishing	1.0	0.7	1.4	1.6	2.6	14.8
Chemical products	1.8	1.8	3.2	2.1	1.1	13.0
Petroleum products	–	–	0.1	–	–	–
Nonmetallic mineral products	5.6	5.2	5.5	5.3	–0.3	10.0
Primary metal products	17.2	12.1	7.7	4.8	–6.9	1.8
Fabricated metal products	7.9	5.5	5.4	4.7	–2.9	7.3
Nonelectrical machinery	2.1	2.7	8.1	7.0	7.1	18.0
Electrical machinery	10.2	11.1	13.7	12.1	1.0	16.4
Transportation equipment	5.6	9.5	10.2	10.5	3.6	15.0
Textiles, clothing, and leather	11.8	3.5	3.3	1.9	–9.7	–0.1
Lumber and furniture	7.0	0.7	0.7	1.1	–9.9	1.9
Plastic and rubber products	6.6	7.2	8.5	8.2	1.2	14.0
Miscellaneous manufactures	9.6	10.1	11.7	10.0	0.2	12.0
Total manufacturing	6.1	6.5	8.4	7.7	1.3	12.8
Farming	1.6	0.8	0.9	0.3	–10.0	6.4
Mining	–	0.6	1.0	0.3	–	–
Utilities	...	...	...	...	...	...
Total nonmanufacturing	0.9	0.7	0.9	0.3	–6.6	7.9
All industries	5.3	5.4	7.3	5.8	0.5	12.7

[1] Compounded annual average growth rates.

Source Estimates by the authors, based on data from Statistics Canada.

Table A-20

Share of the Asian NICs in Canadian Imports, by Industry, 1971-89

	Share				Share growth,[1] 1971-89	Import growth,[1] 1971-89
	1971	1981	1986	1989		
			(Per cent)			
Food, beverages, and tobacco	0.3	0.7	0.6	1.0	7.5	17.3
Paper and publishing	0.2	0.3	0.8	1.4	10.4	23.5
Chemical products	0.2	0.5	1.2	1.3	12.4	25.6
Petroleum products	–	0.6	1.2	1.0	–	–
Nonmetallic mineral products	0.8	2.5	3.2	4.5	9.6	21.0
Primary metal products	0.1	1.6	2.7	2.1	22.0	33.4
Fabricated metal products	1.0	4.5	10.2	11.8	14.5	26.6
Nonelectrical machinery	–	0.5	1.1	1.7	22.9	35.4
Electrical machinery	1.2	4.9	6.8	10.3	12.7	29.9
Transportation equipment	–	0.6	1.7	1.1	26.8	40.9
Textiles, clothing, and leather	10.6	23.3	31.2	30.7	6.1	16.7
Lumber and furniture	13.5	7.9	9.5	8.5	–2.5	10.3
Plastic and rubber products	1.0	3.5	8.0	8.7	12.6	26.9
Miscellaneous manufactures	3.4	8.8	13.5	13.6	8.0	20.7
Total manufacturing	1.4	3.3	5.3	6.1	8.5	20.8
Farming	1.9	2.2	1.6	0.7	–5.5	11.8
Mining	–	0.1	–	–	–	–
Utilities	. . .	. . .	. . .	. . .	. . .	. . .
Total nonmanufacturing	1.0	1.0	1.1	0.6	–3.2	11.8
All industries	1.4	2.9	4.6	4.7	7.1	20.2

1 Compounded annual average growth rates.

Source Estimates by the authors, based on data from Statistics Canada.

Table A-21

Share of the rest of the world in Canadian imports, by industry, 1971-89

	Share				Share growth,[1] 1971-89	Import growth,[1] 1971-89
	1971	1981	1986	1989		
	(Per cent)					
Food, beverages, and tobacco	45.9	34.6	33.1	25.4	–3.2	5.6
Paper and publishing	1.4	1.2	5.6	4.4	6.7	19.3
Chemical products	5.2	4.8	6.5	5.6	0.4	12.3
Petroleum products	61.1	27.3	24.4	32.8	–3.4	7.2
Nonmetallic mineral products	6.1	7.2	8.7	13.1	4.4	15.2
Primary metal products	8.4	15.2	15.5	19.2	4.7	14.4
Fabricated metal products	9.6	4.4	8.6	7.5	–1.4	9.0
Nonelectrical machinery	3.4	3.7	6.8	7.4	4.3	14.9
Electrical machinery	2.4	1.6	3.3	4.7	3.9	19.8
Transportation equipment	0.9	1.2	3.0	1.7	3.9	15.4
Textiles, clothing, and leather	14.5	17.4	21.9	25.4	3.2	13.5
Lumber and furniture	7.1	9.0	12.0	8.5	1.0	14.3
Plastic and rubber products	1.9	2.3	3.7	3.7	3.6	16.7
Miscellaneous manufactures	5.2	4.0	6.2	9.0	3.1	15.3
Total manufacturing	6.9	5.9	7.4	7.8	0.7	12.1
Farming	11.1	10.8	10.6	5.1	–4.3	13.3
Mining	52.1	53.4	35.9	37.9	–1.8	7.4
Utilities	. . .	. . .	. . .	. . .	. . .	. . .
Total nonmanufacturing	29.8	34.2	18.8	10.6	–5.6	9.1
All industries	10.3	11.1	9.2	8.5	–1.1	11.0

1 Compounded annual average growth rates.

Source Estimates by the authors, based on data from Statistics Canada.

B Empirical Implementation of the Trade Equations

This appendix discusses certain details regarding the empirical implementation of the model outlined earlier. We first discuss the dependent variables and then outline some of the assumptions and methodologies used in the creation of the independent variables.

Dependent Variables

For the purposes of the analysis it was necessary to derive estimates of trade flows by *industry* and by country or region. Converting trade data from a commodity basis to an industry basis is a laborious process if undertaken at a disaggregated level. However, for our purposes a broad reclassification from commodity to industry was considered sufficient given the time limitations. In addition, the data for the various other variables used in the analysis, most importantly the data for costs, production, and productivity by country, were at the two-digit SIC level only. Aggregating the commodity trade data to this level using a broad concordance was not expected to result in unduly large inaccuracies. Figure B-1 (page 124) presents the concordance scheme that we used to convert the World Trade Data Base (WTDB) from a commodity to a two-digit industry classification. The data is for the years 1971, 1973, 1975-76, 1979-83, and 1985-88. The classification includes 14 manufacturing industries and three nonmanufacturing industries. Trade in the utilities industry is quite small and was excluded from our analysis. The farming and mining industries were also excluded from the econometric analysis of trade flows and structure due to the lack of data on production and costs for countries or regions other than Canada.

The econometric analysis of Canada's trade flows and patterns is therefore focused on manufacturing trade rather than total industry trade. It is also focused on four major regional markets – the United States, the European Community, Japan, and the Asian NICs – rather than on total trade with the world. Nevertheless, the subset of total industry trade flows to the world that we consider does represent a major portion of Canada's trade. In 1989, manufacturing exports to the four regions represented 73 per cent of total exports to the world. Manufacturing imports from the four regions were about 69 per cent of the total in that year.

The four export penetration equations and the four import penetration equations were estimated independently. In reality the dependent variables are simultaneously determined (since shares must sum to one) and cross-equation restrictions may exist. Thus the usual ordinary-least-squares regression procedure may not be optimal. One common method of dealing with such a system is the use of a translog functional specification, although this methodology would require the assumption that shares in apparent demand are effected only by current relative costs and not by lagged relative costs. An alternative method is the use of seemingly unrelated regression equation (SURE) estimates. In this approach the usual ordinary-least-square coefficient estimates are calculated, but their standard deviations are adjusted to reflect the cross-equation relationships. While we recognize the possible weakness of our approach, it was necessitated by time limitations. Alternative estimation methods may alter the statistical significance of the coefficients, but it is expected that the signs and magnitudes would be similar.

Explanatory Variables

A number of assumptions were necessary in the construction of the explanatory variables. Of particular importance is the assumption, required by data limitations, that West Germany represents a good proxy for the European Community in terms of the Canada-EC countries trading relationship. This is likely a valid assumption since Germany is the industrial leader of the EC countries and produces about 30 per cent of its manufacturing output. The dependent variables, Canada's export and import penetration vis-à-vis the EC countries, are based on the European Community as a whole since its aggregate trade and production data by industry were obtainable. However, all of the independent variables (costs, comparative advantage, trade barriers, capacity utilization, R&D, etc.) used to characterize the European Community are proxied by variables for Germany.

The construction of the independent variables on an industry basis presented a few problems in the case of Japan. Specifically, for many of the variables, data for the lumber, furniture, plastics and rubber, leather, and publishing industries were not available. Instead, these industries were included in the miscellaneous category. Thus, for the lumber and furniture and plastics and rubber industries, data for miscellaneous manufactures were used. For the paper and publishing industry, data for paper alone were used; and for the textiles, clothing, and leather industry, data for textiles and clothing alone were used.

An additional problem with the Japanese data was that information prior to 1970 was often not available. Thus for the construction of the five-year moving averages for the relative costs, relative R&D intensity, and exchange rate variability variables, values for 1970 were extended backwards to previous years. Similarly, for a number of variables for each country (comparative advantage, purchasing power parity rates) data for 1985 were used for 1986.

The relative cost variables are some of the key independent variables thought to explain trade patterns and trends. As noted in the section entitled "An econometric model of Canada's trade flows," two cost variables were created for each equation. The first is straightforward and is simply the costs of the exporter relative to those of the importer. The second cost variable relates the costs of the exporter to a weighted average of the costs of competing exporters in the importer's market. We used Japan, Germany, and the United States as the "competitors" in the importing market, with the average 1971-86 share in imports of each as the aggregation weights. Unit labour costs were used as the cost variable for these countries and for Canada.

For the Asian NICs a somewhat different approach was required since the unit labour cost was not available. Instead, hourly compensation costs in U.S. dollars (wages and benefits) for production workers for each country and for the Asian NICs combined were used to derive the appropriate relative cost variables. The aggregate compensation cost variables for the Asian NICs were derived by aggregating the individual country compensation costs using import weights.

The relative R&D intensity variables were derived in the same way as the relative cost variables. A weighted average of the R&D intensities of the "competitors" was calculated using import shares as weights. The R&D intensity of the importer relative to those of the domestic industry and third-country competitors was then used to proxy a relative quality or technological gap effect assumed to be inherent in the imports. R&D data for the Asian NICs was not available.

Figure B-1

Concordance between the International Standard Industrial Classification (ISIC) and the Standard International Trade Classification (SITC)

	ISIC	SITC
Food, beverages, and tobacco	31	[*]
Paper and publishing	34	25, 64, 892
Chemical products	351, 352	5
Petroleum products	353, 354	33-333
Nonmetallic mineral products	36	66
Primary metal products	37	67, 68
Fabricated metal products	381	69
Nonelectrical machinery	3821 to 3824, 3829	71, 72, 73, 74
Electrical machinery	3825, 383	75, 76, 77
Transportation equipment	384	78, 79
Textiles, clothing, and leather products	32	26, 61, 65, 84, 85
Lumber and furniture	33	63, 82, 248
Plastic and rubber products	355, 356	233, 62
Miscellaneous manufactures	385, 39	81, 83, 87, 88, 89-882
Total manufacturing	3	
Farming	1	Total exports – manufactured exports – (27 + 28 + 32 + 333 + 34 + 35)
Mining	2	28, 32, 333, 34
Utilities	4	35
Total nonmanufacturing	1, 2, 4	Total exports – manufactured exports
All industries	1, 2, 3, 4	0 to 9

[*] Based on OECD SITC to ISIC concordance.

Figure B-2

Description of variables

Variable:	Description
Import penetration (into Canada)	Ratio of Canadian imports to total domestic supply (apparent consumption = production plus imports less exports), industry- and country/region-specific. Source: Trade data from Statistics Canada World Trade Data Base (WTDB). Unpublished production data from Statistics Canada.
Export penetration (by Canada)	Ratio of Canadian exports to foreign total domestic supply, industry- and country/region-specific. Source: Trade data from the WTDB. For the United States, unpublished production data from the Bureau of Labor Statistics (BLS). For Japan and EC countries' production, unpublished data from the OECD Structural Analysis Database (STAN), converted to U.S. dollars using IMF exchange rates.
Tariff barriers	Post-Tokyo Round (1987) tariff rates, sector-specific. Source: Rates of protection from Deardorff and Stern [1989]. Germany is used as a proxy for the EC countries. Output weights for industry aggregation from United Nations, *Industrial Statistics Yearbook*, 1985 and 1987. Country aggregation weights for tariffs facing Canada in Asian NICs' markets are 1987 shares in Canadian exports.
Nontariff barriers	Tariff equivalents of major nontariff barriers, sector-specific. Source: Same as for tariff barriers. No data available for the Asian NICs.
Investment linkages	Data for Canada only. Ratio of U.S.-controlled corporation assets to total corporation assets in Canada. Similarly done for "other foreign-controlled" corporation assets in Canada. Sector-specific. Source: Estimates based on Statistics Canada, Cat. 61-210, CALURA, part 1, various years.

Figure B-2 (cont'd.)

	Description
Relative unit labour costs (exporter relative to importer)	Ratio of exporter's unit labour costs to those of importer; Germany is used as a proxy for the European Community. Relative wages are used for the Canada-Asian NICs relationship. Sector-specific. Source: Unit labour costs are the authors' estimates, based on unpublished BLS data [Rao, Tcharkari, and Lemprière 1990]. Wage data from same source.
Relative unit labour costs (exporter relative to competing exporters in the importing market)	Ratio of exporter's unit labour costs to a weighted aggregation of those of competing exporters in the given importing market. Relative wages are used for the Canada-Asian NICs relationship. Weights are shares in total imports. Sector-specific. Source: Unit labour costs are the authors' estimates, based on unpublished BLS data [Rao, Tcharkari, and Lemprière 1990]. Wage data from same source. Import weights derived from the WTDB.
Relative R&D intensity (exporter relative to importer)	Ratio of exporter's R&D intensity (business expenditures on R&D as a percentage of output) to that of importer. Germany is used as a proxy for the European Community. No data is available for the Asian NICs. Sector-specific. Source: Output – unpublished data from the BLS for Canada and the United States, and unpublished data from STAN for Japan and Germany. R&D – for Canada, Statistics Canada, cat. 88-001, 88-202, and 88-509; for the United States, National Science Board, "Science and technology indicators, 1987" and "Science indicators, 1976," and National Science Foundation, "Research and development in industry, 1982"; for Japan and Germany, unpublished data from STAN.
Relative R&D intensity (exporter relative to competing exporters in the importing market)	Ratio of exporter's R&D intensity to a weighted aggregation of those of competing exporters in the given importing market. Germany is used as a proxy for the European Community. No data is available for the Asian NICs. Weights are shares in total imports. Sector-specific. Source: Same as preceding variable. Import weights are derived from the WTDB.
Real exchange rate	Defined as $\mid RER - \overline{RER} \mid / \overline{RER}$, where RER is the real exchange rate and $\overline{RER}$ is its five-

Figure B-2 (concl'd.)

	Description
	year moving average. The real exchange rate is measured as the ratio of the market exchange rate to the purchasing power parity (PPP) exchange rate. Exchange rates are measured as foreign currency units per Canadian dollar. Germany is used as a proxy for the European Community. No data is available for the Asian NICs. Sector-specific. Source: Market exchange ratio from the IMF, *International Financial Statistics*. PPP rates are the authors' estimates, based on data from the BLS and OECD [Rao and Lemprière 1992*a*].
Comparative advantage	The ratio of an industry's labour productivity relative to the labour productivity of the aggregate manufacturing sector. Germany is used as a proxy for the European Community. No data is available for the Asian NICs. Sector-specific. Source: Authors' estimates, based on unpublished data from the BLS [Rao and Lemprière 1992*a*].
Capacity utilization	For Canada and the United States, the ratio of the five-year moving average of the real capital/output ratio to the current period real capital/output ratio. Capital stock is used for Canada and capital inputs are used for the United States. For Germany (proxy for the European Community) and Japan, the ratio of the real net output to the moving average of the last five years. Source: Authors' estimates. For Canada, unpublished data from Statistics Canada. For the United States, Japan, and Germany, unpublished data from the BLS.

Notes

1 Services and merchandise trade. The data used here are taken from the *Bank of Canada Review*. They are not entirely consistent with the data from Statistics Canada's World Trade Data Base, which we use for our analysis.

2 This decomposition analysis assumes that the growth in manufacturing wages did not lead consumer price inflation in Canada. Instead, it assumes that consumer price inflation became embedded in manufacturing nominal wage growth. These are reasonable assumptions, because labour productivity in manufacturing grew at a considerably faster pace than the growth in the real consumer wage and somewhat faster than the real producer wage.

3 For a discussion of the construction of the World Trade Data Base by Statistics Canada, see Rao [1992]. A discussion of the commodity-industry conversion procedure and the aggregation parameters is provided in Appendix B.

4 See Stern, Francis, and Schumacher [1976]; Goldstein and Khan [1978]; Branson [1968, 1972, 1980]; Sheills, Stern, and Deardorff [1986]; Létourneau and Lester [1988]; Perée and Steinherr [1989]; Rugman [1988]; Caves [1982, 1990]; Cline [1990]; MacCharles [1987]; Leamer and Stern [1970]; Leamer [1984]; Markusen [1992]; Balassa [1979]; and Balassa and Noland [1988].

5 One of the outside readers of this paper has argued that exports need not be subtracted from output to derive apparent consumption, because exports by themselves could be an important source of demand for imports.

6 It would have been theoretically more sound if equations were estimated in terms of supply and demand rather than reduced form and in terms of quantity rather than value. The reduced-form approach sometimes makes the results difficult to interpret. Nevertheless, it is commonly used in this area. However, due to lack of separate trade-price data at industry level, we could not estimate equations for price and quantity for both exports and imports.

7 See Leamer and Stern [1970]; Kholi [1982]; Khan and Ross [1977]; Goldstein and Khan [1978, 1985]; and Cline [1990].

8 In addition, since the export and import equations are specified in value terms, the longer-term cost elasticities could be significantly biased downward [Branson 1968].

9 However, there has been a growing awareness that the underlying assumptions of comparative advantage theories of trade (such as constant returns to scale, identical technologies, and homogenous products) are unrealistic in many industries. Therefore, the factor endowments theory is unable to fully explain trade patterns among countries [Caves 1990; Rugman 1988; Porter 1990].

10 For instance, a significant trend change in the structure of domestic apparent consumption (volume), without changes in the total level, could generate a trend growth in imports (value terms) independent of its level, because of the differences in the expenditure elasticities of individual components. Similarly, large changes in the relative prices of individual components of trade flows (volume) could also produce trend changes in the value of exports and imports, independent of the other effects.

11 The dependent variable used in the equations for import penetration by the Asian NICs is constructed as their share of exports to Canada's total imports.

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